ARCHIVES OF OPHTHALMOLOGY.

DESCEMETITIS A SYMPTOM OF INFLAMMATION IN ANY PORTION OF THE UVEA:

SEROUS IRITIS NOT A DISEASE PER SE.[1]

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ALTHOUGH the branch of medicine to which we devote ourselves has been brought to an almost scientific exactness, thanks to instruments of precision, we now and then meet with a fact which seems to be persistently misunderstood and misinterpreted.

This arises, doubtless, from absorption in larger affairs; it is easier, too, to accept the accredited explanation than to reiterate the persistent "Why?" that finally wrings a reply from nature.

The present question is a glaring example; settled correctly, doubtless, in the minds of many, it remains incorrectly or uncertainly treated in our text-books, the charts, after all, by which we must lay our courses across the unending sea of medical practice.

This I have thought may be due to the lack of a proper collection of conclusive cases. The proposition I desire to submit is, therefore, twofold: First, that the older writers recognized a distinct, separate, or specific disease which they called by the names Aquo-capsulitis, Descemetitis, Keratitis punctata, or Serous Iritis, and that the modern text writers have nowhere boldly and definitely defined and corrected

[1] A paper read by title before the Louisiana State Medical Society, April, 1901.

this error. Secondly, that there is no such disease as the aquo-capsulitis of the older or the serous iritis of the later authors; the so-called disease not being a pathological entity, but merely a set of symptoms due to inflammation that may have its seat in any part of the uveal coat.

That a number of my readers may have come to a similar conclusion I do not doubt, but the truth of the assertion that the older writers were in error, and that the later have treated the subject obscurely and with a feeble touch, I desire to substantiate by a number of references to magisterial authorities. My own interpretation of the facts I shall endeavor to maintain by a series of case histories so unequivocal that they must either be explained away or accepted as conclusive.

Nearly all the texts that I have been able to consult, from Wharton Jones in 1847 to Jackson in 1900, contain in their indexes and in their body mention and description of a definite disease known variously as Aquo-capsulitis, Keratitis punctata, Descemetitis, or Serous Iritis. Consultation of the passages herewith referred to will remove any necessity for argument to prove that these names do and are meant to signify very much the same group of symptoms.

T. Wharton Jones: *The Principles and Practice of Ophthalmic Medicine and Surgery.* Edited by Isaac Hays, M.D., Philadelphia, 1847. The index refers to aquo-capsulitis, and on pages 149 and 150 we find: Aquo-capsulitis (inflammation of the membrane of the anterior chamber of the aqueous humor, keratitis serosa, iritis serosa, anterior keratoiritis).

L. A. Desmarres: *Traité théorique et pratique des maladies des yeux.* Paris, 1847.

This work, in a poor index by chapters, refers to Kératite ponctuée ou pointillée—punctated keratitis, p. 27, and Inflammation de la membrane de l'humeur aqueuse, p. 369. In the first article, Desmarres, so far as I can make him out, is describing what we now know as parenchymatous keratitis; there is no mention of the spots characteristic of descemetitis. In the second article (p. 369), the synonyms, descemetite, aquo-capsulite, are given.

The paragraph on etiology is worthy of translation on account of the reference to the views of Ammon that it contains: "*Etiology.*—The causes of this disease are but little understood: derangement of the alimentary canal, dampness and sudden changes of temperature, and the scrofulous temperament are noteworthy. Sometimes I have observed it in weak old men long after couching for cataract. Himly thinks it is oftenest produced by abrasions of the cornea inflicted by foreign bodies; above all, he has seen it after the operation for cataract by keratonyxis. On the other hand, Ammon does not believe a wound can produce aquo-capsulitis, which, for him, *is but an iritis or uveitis* [italics the translator's], unless there be a scrofulous, psoriatic, or rheumatic dyscrasia."

Traité pratique des maladies des yeux, par A. Scarpa; traduit et augmenté de notes par J. B. F. Léveillé; augmenté d'un grand nombre d'articles par M. Rognetta. Paris, 1855. Under the heading Hydrocapsulite we are referred to p. 115.

William MacKenzie, M.D.: *A Practical Treatise on the Diseases of the Eye*, with notes and additions by Addinell Hewson, A.M., M.D. Philadelphia: Blanchard and Lea, 1855. The index refers to aquo-capsulitis, p. 546.

A Guide to the Practical Study of Diseases of the Eye. By James Dixon. From second London edition. Philadelphia: Lindsay and Blakiston, 1860. There is no index, but the table of contents refers to "combined inflammation of iris and cornea; described by authors as aquo-capsulitis," p. 178.

L. DeWecker: *Ocular therapeutics.* Translated and edited by Litton Forbes, M.D. New York: William Wood & Co., 1879. The index refers to serous iritis, p. 174.

Diseases of the Eye. By J. Soelberg Wells. Fourth American, from the third English, edition, with copious additions by Charles Stedman Bull, M.D. Philadelphia: Henry C. Lea's Son & Co., 1883. The index refers to serous iritis, aquo-capsulitis, descemetitis, p. 278.

A Text-Book of Diseases of the Eye. By Henry D. Noyes, A.M., M.D. The index refers to aquo-capsulitis (p. 407) and to serous iritis (pp. 429, 490, 526).

A Text-Book of Ophthalmology. By Dr. Ernst Fuchs. Authorized translation, revised from the seventh enlarged and improved German edition, by A. Duane, M.D. New York: D. Appleton & Co., 1899.

Ocular Therapeutics for Physicians and Students. By F. W. Max Oehlemann, M.D. Translated and edited by Chas. A. Oliver, A.M., M.D. P. Blakiston's Son & Co., Philadelphia, 1899. The index does not refer to aquo-capsulitis, but does mention keratitis punctata, serous iritis, and descemetitis, p. 203.

A Manual of the Diagnosis and Treatment of the Diseases of the Eye. By Edward Jackson, A.M., M.D. Philadelphia: W. B. Saunders, 1900. The index does not refer to aquo-capsulitis, but to punctate keratitis, pp. 297, 318, 324, and to serous iritis, pp. 319 and 324. On page 297 mention is made that the term punctate keratitis has been applied to the pyramidal-shaped deposits on the posterior surface of the cornea, and other uses of the name are referred to here and on page 318. On page 324, however, under the caption "Cyclitis (Serous Iritis, Irido-Cyclitis, Keratitis Punctata)" we find a description of the condition we are considering.

Edward Nettleship: *Diseases of the Eye.* Revised and edited by W. C. Posey, M.D. Sixth American, from the sixth English, edition. Philadelphia, 1900. The index refers to keratitis punctata and serous iritis, pp. 148, 149.

These citations, extending from the year 1847 to the present day, are enough to justify my assertion that the older text-writers were in error, and the modern have treated the subject with a feeble touch.

There can be no doubt that T. Wharton Jones writes of what he regards as a definite disease, an active, plastic inflammation of the lining membrane or capsule of the anterior chamber. His description of what is now known as "serous iritis" is good, though at times he seems to intermingle the symptoms of acute plastic iritis. From his mention of "the exudation of lymph into the pupil, and on the surface of the iris, where new vessels may make their appearance," of "contraction and sluggishness or immobility of the pupil," of pain occurring in nocturnal paroxysms, and of dimness

of vision being at times caused by exudation in the pupil, it would seem that he had observed (as the writer has) descemetitis in cases of acute plastic iritis. The citation from Ammon is remarkable, showing as it does an enormous advance beyond the current pathological conceptions of his day.

It is no less evident that Desmarres, in spite of his wealth of detail and minute observation, had but ill-defined ideas of pathology, and confused under one description several diseases. It is quite clear, however, that he is describing what to his mind was a distinct pathological entity.

Scarpa, after saying positively that he has never seen isolated inflammation of the "hydrogenous membrane of the anterior chamber" consents to follow Wardrop, Lawrence, and Middlemore, and describes hydro-capsulitis as a distinct disease. His description of what we call to-day serous iritis is systematic and hardly to be surpassed. In his remarks under prognosis we see that his own experience has taught him to look on hydro-capsulitis as the evidence of some severe "internal ophthalmia." Particularly to be noted is Scarpa's anatomical description of the lining membrane of the anterior chamber. He cites Zinn, Hovius, Descemet, Demours, Arnold, and Unna, and first, of all those that I have been able to consult, clearly recognizes that this membrane does not form a complete closed sac, and, following Arnold, traces it to an origin in the uvea.

MacKenzie recognizes a definite disease, aquo-capsulitis, in so many words: "By aquo-capsulitis, a disease first recognized by Mr. Wardrop in 1808, is meant inflammation of the parietes of the aqueous chambers, especially of the membrane which lines the internal surface of the interior of the cornea, and is partially continued in the form of fine fibres into the anterior surface of the iris." And again: "Although it is, therefore, incorrect to speak of the anterior and posterior chambers as lined by a shut sac or serous membrane, or of the aqueous humor as contained within a proper capsule, the name aquo-capsulitis, with these explanations, may still be retained to designate a very distinct disease." His description includes more than we should think of call-

ing serous iritis, and evidently comprises pathological conditions that we now differentiate.

James Dixon definitely abandons aquo-capsulitis and says the term should be erased from our vocabulary as being based on false anatomy. But after saying that Wardrop describes, under the name of aquo-capsulitis, cases both of iritis and severe inflammation and softening of the cornea, and the affection that he proposes to speak of is characterized by a much less acute course, he proceeds to describe interstitial keratitis. Thus in 1860 Mr. Dixon, upon anatomical grounds, has gotten rid of the false view of an inflammatory affection with dropsy and plastic exudation of a closed serous sac lining the anterior chamber. On the other hand, we fail to find anywhere in his work mention of the mild circumcorneal injection, slight discoloration of the iris, increase in depth of the anterior chamber, rising tension, and the triangular patch of minute deposits upon the posterior surface of the cornea characteristic of what is now known as serous iritis,—all of which are so clearly set forth in the minute but mixed descriptions of the older authors.

De Wecker frankly describes serous iritis as a definite disease. He lays stress upon the elevation of tension, and says the affection is confined essentially to the excretory circle of the eye; the seat of the disease is not only in the iris proper, but also in the lymphatic spaces enclosed by the pericorneal trabecular tissue; and the iris proper is much less affected than in other forms of iritis.

Soelberg Wells (1883) gives so accurate and complete an account of "serous iritis" that it appears impossible to better it. He, however, is led by lack of fuller observation into the erroneous belief that a "serous iritis" often "extends" to the ciliary body and choroid; this, too, in spite of his having noted that serous iritis "occasionally" accompanies deep-seated inflammations of the eye, and that sympathetic ophthalmia sometimes appears in this form. Here we perceive the awakening of a suspicion that descemetitis may have a graver import than that commonly ascribed to it.

In Noyes's text this suspicion is seen deepening almost to a

certainty; but after relating the post-mortem examinations of Knies and Fontan, and after asserting that the corneal manifestation is subsidiary to a larger process, that it is only an outlying indication of a deeper lesion and not a disease per se, etc., he confesses that "whether all cases of keratitis punctata may be so regarded remains to be learned," and guards himself with the extremely cautious utterance that the condition "might perhaps be called *uveitis serosa*."

It will be seen by consulting the pages of Fuchs, the master text-writer of the day, that he is very near to making the assertion that forms the burden of this paper, but never does so in unequivocal terms. On page 287, he says that chronic idiopathic iritis *generally* appears as an irido-choroiditis chronica (also called serous iritis), and further on speaks of the fine deposits on the posterior surface of the cornea as pointing, *in this* condition, to the implication of the posterior division of the uvea. But on page 276, in speaking of simple cyclitis,—and his language throughout implies that he regards the deposits characteristic of descemetitis as oftenest to be seen in cases of cyclitis,—he says: "They are found not only in affections of the ciliary body, but sometimes also in those of the *most anterior sections* of the choroid"; and he recites an illustrative case. Fuchs does, however, emphatically condemn the terms aquo-capsulitis, keratitis punctata, and serous iritis as inapplicable and altogether to be rejected. In fine, Fuchs seems to have recognized that there is no such disease as serous iritis; that descemetitis is a common symptom in cyclitis, and is sometimes to be met with in disease of the anterior segment of the choroid and in chronic idiopathic irido-choroiditis; that its presence should render us suspicious as to the condition of the choroid; but he has not realized, or at any rate expressed, my contention that the symptoms under consideration may and do occur as the result of inflammation of any portion of the uvea.

Nettleship does not refer to aquo-capsulitis, and has evidently abandoned keratitis punctata or serous iritis as a disease per se. Indeed, if we removed the word "almost" from the statement, on page 149, that "keratitis punctata

is, almost without exception, secondary to some disease of the cornea, iris, choroid, or vitreous," and omit cornea and vitreous, and if we add in the chapter on choroiditis, page 213, that while choroiditis, unlike inflammations of its continuations, the ciliary body and iris, is seldom shown by severe external congestion or severe pain, it is frequently denoted by mild injection and the presence of keratitis punctata or descemetitis, the conception of Mr. Nettleship would nearly coincide with mine.

Ohlemann frankly recognizes serous iritis as a definite disease (p. 203).

Jackson, the author of our very latest text-book, identifies serous iritis as cyclitis (p. 324), and regards the well-known figure of descemetitis, which he illustrates, as the most characteristic symptom of this inflammation. He does not refer to its presence in disease of other parts of the uveal tract.

Schmidt-Rimpler: *Ophthalmology and Ophthalmoscopy.* Translated from the third German edition by Dr. D. B. St. John Roosa. New York, 1889.

Serous iritis is apt to be associated with serous choroiditis and opacities of the vitreous. The tension of the globe is then increased, and pressure excavation of the nerve is to be apprehended. This form develops secondarily, though not in complete purity, in pannous keratitis. Punctate keratitis and descemetitis are treated as symptoms.

Edouard Meyer: *A Practical Treatise on Diseases of the Eye.* Translated from the third French and fourth German Editions by Freeland Fergus. Philadelphia, 1887. Punctate keratitis, in which descemetitis occurs, is deep parenchymatous keratitis. Serous iritis is described as a distinct disease; the pupil is semi-dilated and fixed. Aquocapsulitis is not in the index.

Adolf Alt: *A Treatise on Ophthalmology for the General Practitioner.* St. Louis, 1884. Serous iritis is described. There is slight increase of T; the synechiæ are usually not very firm nor the pupil likely to be small. The dots on the posterior surface of the cornea are due to proliferation of the cells of Descemet's membrane, which may be provoked by deposits of fibrin.

Henry R. Swanzy: *Handbook of the Diseases of the Eyes.* New York, 1884. Pure serous iritis is perhaps not so common as a mixed form of sero-plastic iritis. He describes *serous cyclitis.*

Henry E. Juler: *A Handbook of Ophthalmic Science and Practice.* Philadelphia: Henry C. Lea's Son & Co., 1884.

Juler gives a good description of what has been known as serous iritis and mentions the synonyms, aquo-capsulitis, keratitis punctata, and descemetitis. The inflammation, he says, is prone to extend backward. On page 151 he gives the same description of what he calls serous choroiditis, but here vitreous opacities are to be found. Vision is impaired in proportion to the opacity of the media.

George A. Berry: *Diseases of the Eye.* Philadelphia, 1889. Serous iritis is almost always associated with cyclitis or choroiditis. It is more properly to be called an irido-cyclitis.

R. Brudenell Carter: *A Practical Treatise on Diseases of the Eye.* Edited by John Green, M.D. Philadelphia, 1876. Serous iritis is said to be a comparatively rare disease, chiefly associated with grave disturbance of the general health.

Haab: *Atlas of the External Diseases of the Eye*, edited by De Schweinitz, Philadelphia, 1899, has serous iritis only in the index. The symptoms that we have under consideration are ascribed to cyclitis alone, and on p. 180 Haab writes of insidious simple cyclitis: "The term serous iritis was formerly given to this variety; but the name is incorrect and now obsolete."

Finally, while collecting the material for this paper, I received from Dr. William Cheatham of Louisville, Ky., a reprint of his article: "Is there ever a Serous Iritis without an Involvement of the Ciliary Body, or Choroid, or Both?" published in the *Ophthalmic Record* of August, 1897. Dr. Cheatham says that his "object in presenting this subject is to call attention to one of the many defects in our nomenclature of diseases of the eye. . . . I have never seen a case of iritis serosa myself without an involvement of both the ciliary body and the choroid with hyalitis, any one of

these latter complications being as serious, or more so, as the involvement of the iris, from which the disease gets its name. . . . I never saw a case of this affection but what we had an involvement of the whole of the uveal tract. . . . Some gentlemen may think that they have seen cases of serous iritis *per se*, but I believe if more careful examination for involvement of the ciliary body and the choroid be made, they will conclude, as I have, that the disease is an involvement of the whole of the uveal tract, or, as Noyes says, a 'Serous Uveitis,' or even more; possibly with involvement in all cases of the vitreous, and in a majority of them of the retina and optic papilla." I believe that Dr. Cheatham here borders closely on the truth; but I do not agree that the symptoms indicate an involvement (in the sense of a primary inflammation) of the whole uveal tract or that it is proper to construe them to mean a *serous* uveitis. Indeed, there can no more be such a thing as a serous uveitis than there can be a serous iritis; and I shall now endeavor to show by illustrative cases that the symptoms formerly grouped under the latter name may be indicative of an inflammation of any portion of the uveal coat.

Illustrative Cases of Descemetitis with Acute Plastic Iritis.

No. 1.—L. G., a white girl, æt. thirteen, presents herself at the clinic of the Eye, Ear, Nose, and Throat Hospital on March 21, 1898. Her general condition and appearance are good. She says that the L. E. has been sore for one week; it is painful at night and V. is dim. The appearances are all those of an acute plastic iritis, but V. of the L. E. is only $\frac{2}{4\,0}$. This leads to the discovery of well-marked descemetitis, and a diagnosis of acute plastic iritis, with descemetitis is made. Atropine (1 %) is repeatedly instilled at the clinic. March 23d—Atropine at clinic; potass. iod. gr. v. t. i. d. April 1st—The condition remains about stationary. The potass. iod. is raised to gr. x. t. i. d. A salve of mercurial ointment and belladonna extract (one oz. to one drachm) is rubbed into the forehead, and atropine repeatedly instilled at the clinic. The patient never returned.

No. 2.—M. B., a white woman, æt. thirty-eight, a factory hand, comes to the clinic on July 11, 1898. Her general appearance is good. She says that her R. E. has been bad two weeks; she thinks that she caught cold in it; there is severe supraorbital pain. The appearances are those of acute plastic iritis, but

V. = $\frac{2}{10}$. Atropine is repeatedly instilled, and examination reveals posterior synechiæ and so-called descemetitis. She is directed to bathe the eye with very hot water frequently at home. July 13th—Very little pain; the pupil is only partially dilated. The same treatment is continued. July 15th—Posterior synechiæ remain, and pupil is only partially dilated. Potass. iod. grs. xx. t. i. d. is added to the treatment. July 20th—Improvement. July 25th—Practically well; atropine instilled three times a week. Aug. 3d—Discharged cured; R. E., V. (under atropine) = $\frac{8}{10}$. It is interesting to note that this patient presented herself with a relapse in the same eye on Sept. 6, 1898, at which time complete circular posterior synechia was noted and the V. = $\frac{6}{10}$ only. The notes say nothing of the presence of descemetitis. She was put upon the same treatment, and was again discharged cured on October 10, 1898, with V. in this, the R. E., = $\frac{8}{10}$.

No. 3.—W. Z., a white laborer, æt. thirty, applies at the clinic for relief, on July 4, 1898, complaining that he has suffered with his L. E. for five days. His health has been poor since last January, when he contracted syphilis, for which he is still under treatment. The L. E. is acutely painful, and there is every appearance of an acute plastic iritis. After repeated instillations of atropine, descemetitis is discovered. He is put upon a "mixed treatment." Under atropine the pupil has dilated two-thirds and the pain diminished. July 6th—No pain; pupil dilated $\frac{2}{3}$; ciliary injection very marked. July 7th—Dilatation of pupil almost complete; ciliary injection slightly diminished. July 9th—Dilatation of pupil increased to $\frac{3}{4}$. July 15th—Pupil dilated to the maximum; ciliary injection much less. July 25th—Still on mixed treatment; taking potass. iod. grs. xxxv. t. i. d. Aug. 4th—L. E., V. (under atropine) = $\frac{8}{10}$, but with + 0.50 s. is = $\frac{8}{10}$. Aug. 6, 1898—Discharged cured.

No. 4.—M. S., white woman, married, æt. twenty-nine, comes to the clinic May 8, 1897. L. E. has been painful and the sight dim about two weeks. "It seems as though a cloud was over it." Her general health is not good. She has had pain in her wrist and knee and an eruption on the skin for six months. The L. E. shows ciliary injection; V. = $\frac{1}{200}$; there is the so-called descemetitis. Atropine is instilled. Ophthalmoscopic examination through the dilated pupil reveals nothing abnormal in the vitreous or fundus. Under atropine, L. E., V. = + 0.50 s. = $\frac{8}{10}$. Potass. iod. gr. v. twice daily, and the mercurial and belladonna ointment, to be rubbed into the forehead at night, are ordered; atropine at clinic. May 11th—L. E. injection less; there are two small synechiæ up and inward. May 21st—L. E. no injection; V. (with atropine) = $\frac{8}{10}$. Retino-choroidal congestion marked. June 3d—The R. E. is attacked; pain since Monday; acute plastic iritis, with posterior synechiæ not broken with atropine and cocaine. June 4th—R. E. pupil dilated $\frac{1}{2}$; synechiæ up and inward. June 7th—There is gummatous thickening of the bound-down portion of the iris of R. E.; order potass. iod. grs. x. t. i. d.

June 10th—R. E., injection and pain beginning to subside. June 11th—R. E. much better; L. E. injection appearing again. June 14th—Symptoms of overuse of belladonna. Use atropine only once daily and discontinue ointment on forehead, but continue potass. iod. June 15th—O. U., injection gone; R. E., one synechia upward; L. E. pupil dilated and round. Gave a subconjunctival injection of normal salt solution in R. E. June 18th—Three synechiæ persist; give another injection. June 19th—Synechiæ in R. E. persist; discontinue injections. June 28th—L. E. again congested. June 29th—O. U. again congested; order mercurial and belladonna ointment rubbed into forehead at night. July 15th—All injection gone. July 19th—O. U., V. = $\frac{20}{30}$. July 27th—R. E., V. = $\frac{20}{30}$, a few letters; L. E., V. = $\frac{20}{20}$. Aug. 9th—Eyes entirely free from effects of atropine; R. E. and L. E., V. = $\frac{20}{20}$. Discharged cured.

OF DESCEMETITIS, WITH ACUTE PLASTIC IRITIS AND CYCLITIS (?).

No. 5.—J. B., a negro cook, æt. forty-one, comes to hospital Jan. 23, 1896. She says her L. E. was bad and was cured here three months ago. R. E. painful for the last five days. Her general health is poor. Diagnosis: R. E., acute plastic iritis, probably specific. R. E., V. = $\frac{10}{200}$; L. E. = $\frac{20}{20}$. Atropine is instilled at clinic and frequent bathing of the eye with very hot water, and the mercurial and belladonna ointment on the forehead, at night, ordered at home. Jan. 30th—Pupil well dilated; no pain. Examination reveals well-marked descemetitis and vitreous opacities. Feb. 1st—Much better. Feb. 6th—About well. O. U., V. (atropine) = $\frac{20}{15}$. Discharged cured.

No. 6.—A. C. R., a white clerk, æt. thirty-nine, applies at the clinic on Aug. 20, 1897. His general health, he says, is good. The L. E. has been bad three days; its V. = $\frac{20}{60}$. A diagnosis of acute plastic iritis, with hypopyon, is made, and atropine instilled and hot bathing of the affected eye, at home, ordered. Aug. 21st—The pupil is dilated to the maximum. Aug. 29th—Hypopyon has disappeared. Sept. 13th—Injection fading away. Sept. 20th—L. E. has developed "keratitis punctata" (descemetitis) and dense opacity of the vitreous. All signs of iritis are gone; the pupil is dilated to the maximum, but the V. = l. p. only. He is given potass. iod. grs. v. and hydg. bichlor. gr. $\frac{1}{24}$ t. i. d., in plenty of water, after meals. Oct. 14th—Descemetitis gone; large floating opacities of the vitreous; L. E., V. = $\frac{20}{100}$. Nov. 20th—Floating opacities much fewer; V. = $\frac{20}{30}$, a few letters. Dec. 6th—Opacities much diminished; L. E., V. = $\frac{20}{20}$, nearly perfectly. Allowed to discontinue medicine for three weeks. March 16, 1899—Am able to re-examine patient. There are no external signs of disease or its effects. L. E. examined through the undilated pupil; media clear; nothing abnormal in the fundus. L. E., V. = $\frac{20}{20}$. N.B.—Descemetitis lasted twenty-four days.

No. 7.—A. B., married negress, a seamstress, æt. twenty-five, comes to the clinic on March 17, 1900. She says her R. E. became sore eight days ago. There is pronounced ciliary injection and pain. R. E., V. = $\frac{10}{15}$; L. E., V. = $\frac{15}{15}$. Atropine is instilled, and potass. iod. grs. x. and mercury bichloride gr. $\frac{1}{24}$ are ordered t. i. d. The ophthalmoscope shows descemetitis; a clear view of the fundus is impossible. March 24th—R. E., V. (atropine) = $\frac{15}{15}$. March 27th—Injection rapidly subsiding; ophthalmoscopic view clear but for some vitreous dust, and there is no lesion in the fundus. Same treatment, but the ointment of mercury and belladonna is rubbed into the forehead daily. April 6th—Injection returns; R. E., V. (atropine) = $\frac{15}{15}$. Media clear but for descemetitis, which persists. April 12th—Decided symptoms of iritis; ointment on forehead continued. May 26th—All signs of iritis gone; one posterior synechia persists; still some descemetitis. The ophthalmoscope shows nothing but some vitreous dust. R. E., V. (atropine) = $\frac{15}{15}$. She has to return to her home in the country, and is advised to continue the potass. iod. and the ointment on the forehead at night. N.B.—Descemetitis almost gone at the end of seventy days.

Of Descemetitis with Subacute Cyclitis Following Recent Plastic Iritis.

No. 8.—L. B., white, unmarried, servant, æt. thirty, comes to the clinic February 19, 1895. She says that her general health has been fair and that the L. E. has been bad for five weeks. There is the usual appearance of "serous iritis" including "punctate keratitis." R. E., V. = $\frac{20}{100}$; L. E., V. = l. p. Atropine is instilled, and protoiodide of mercury gr. $\frac{1}{4}$ t. i. d. and frequent hot bathing of the eye are ordered. Feb. 21st—Pupil is now widely dilated and there is a conspicuous ring of pigment left upon the anterior lens capsule; floating vitreous opacities. March 12th—Improving; potass. iod. substituted for the protoiodide. L. E., V. = $\frac{20}{200}$. March 28th—L. E., V. = $\frac{20}{100}$. April 23d—L. E., V. = $\frac{20}{15}$. June 4th—L. E., V. (still under atropine) = $\frac{20}{40}$. Some vitreous opacities persist. Patient does not return.

No. 9.—P. S., a white milkman, æt. sixteen, comes to the clinic September 19, 1895. He says his R. E. has been bad for four months. There is ciliary injection; the pupil is extensively bound down; "descemetitis" is present, but there is no reflex from the fundus and R. E., V. = $\frac{15}{15}$. Atropine is instilled, hot bathing of the eye and protoiodide of mercury $\frac{1}{4}$ gr. t. i. d. are ordered. Sept. 26th—He says he feels better, but the condition is unchanged. Oct. 5th—Much better; pupil beginning to dilate. Patient never returned.

Of Descemetitis with Acute Cyclitis.

No. 10.—A. P., a white machinist, æt. twenty-four, applies for relief April 6, 1897. General health good. The R. E., he says,

has been paining him, at night especially, about a week. There is a minute central abrasion of the cornea. R. E., V. = $\frac{20}{30}$. L. E., V. = $\frac{20}{30}$. Ordered bathing of closed eye with hot water four or five times daily. April 10th—R. E. feels and looks quite well. L. E. shows ciliary hyperæmia and is painful. Advise frequent hot bathing. April 11th—L. E. still congested. Instil atropine. April 14th—Atropine has been instilled every day since April 11th, and L. E. is less red to-day. He says he has had gonorrhœal rheumatism and is ordered to take full doses of "Henry's trichlorides." April 20th—R. E., V. (without atropine) = $\frac{20}{30}$. L. E., V. (with atropine) = $\frac{20}{30}$. R. E. is now the more congested. April 22d—Ordered four teaspoonfuls of Henry's trichlorides daily. L. E., the effect of the atropine having passed away, has become severely congested, the iris somewhat discolored; he says it was very painful last night. O. U., V. = $\frac{20}{30}$, fairly. Atropine is instilled in both eyes and six teaspoonfuls a day of the trichlorides ordered. April 30th—O. U., V. (with atropine) = $\frac{20}{30}$. Ciliary hyperæmia marked in L. E. There is a slight descemetitis O. U., but the vitreous of each eye is clear. Order potass. iod. gr. xx. t. i. d., and the mercurial and belladonna ointment rubbed into the forehead at night. May 1st—Pain very severe last night; order antifebrin and brandy, 20 grs. to the ounce, to be given in broken doses when the pain is severe. May 4th—R. E., V. (with atropine) = $\frac{20}{40}$; L. E., V. (atropine) = $\frac{20}{30}$. May 5th—Very careful examination shows the retinal vessels tortuous and the outlines of disc hazy. There is choroido-retinal congestion, undoubtedly. He has taken no medicine since April 30th except the mercurial and belladonna ointment rubbed into the forehead at night and the atropine instilled at the clinic daily. He is urged to take the potass. iod. ordered at that time. May 8th—All injection is gone. R. E., V. (atropine) = $\frac{20}{40}$, + 1.50 s. ⊃ + 0.50 c. ax. 90° = $\frac{20}{30}$. L. E., V. (atropine) = $\frac{20}{30}$, not improved by glasses. May 10th—R. E., V. = $\frac{20}{30}$; L. E., V. = $\frac{20}{30}$. Eyes look perfectly well and he is discharged cured.

Of Descemetitis with Plastic Choroiditis Posterior.

No. 11.—A. B., a negress, a teacher, æt. eighteen, comes to the clinic April 8, 1897. She says the sight of the R. E. failed ten days ago. Her general health is good. R. E., V. = $\frac{20}{100}$. L. E., V. = $\frac{20}{30}$. The pupil is dilated with atropine. An examination reveals descemetitis and a hemorrhagic neuro-retinitis; which proved afterward to be secondary to a choroiditis. Order instillations of atropine at the clinic and potass. iod gr. x. t. i. d. April 19th—R. E., V. (atropine) = $\frac{20}{70}$. Potass. iod. grs. xv. t. i. d. April 24th—R. E., V. (atropine) = $\frac{20}{50}$. Potass. iod. grs. xx. t. i. d. April 29th—R. E., V. (atropine) = $\frac{20}{40}$. Potass. iod. grs. xxv. t. i. d. The descemetitis has disappeared. May 4th—R. E., V. (atropine) = $\frac{20}{30}$. Ophthalmoscopic examination shows a large patch of choroiditis (choroidal cicatrization) near the disc, up

and outwards. May 8th—Order potass. iod. grs. xxx. t. i. d. May 15th—R. E., V. (atropine) = $\frac{1}{8}$, some letters. May 23d—R. E., V. = $\frac{8}{10}$. June 5th—O. U., V. = $\frac{8}{10}$. Discharged cured, but advised to continue potass. iod. some months longer. N. B.—Descemetitis lasted twenty-one days.

No. 12.—G. C., a negro laborer, æt. forty-three, comes to the hospital June 22, 1899. He says that his general health is good, but for three weeks his R. E. has felt sore and its V. has failed. R. E., V. = counting fingers at two feet; L. E., V. = $\frac{8}{10}$. Atropine is instilled into R. E. June 23d—Ophthalmoscopic examination shows descemetitis and a patch of choroiditis (exudation) near the disc, though the media are not clear enough to allow accurate examination. Potass. iod. grs. v. t. i. d. is ordered, together with the mercurial and belladonna ointment rubbed into the forehead. July 7th—Descemetitis is beginning to disappear; the media are clearer, and the patch of choroidal exudation is more plainly visible. The patient failed to return after this.

No. 13.—E. G. J., a white barkeeper, æt. twenty-one, applies for relief at the hospital March 21, 1899. He says his general health is now very good, but he has had syphilis. R. E. has been dim for about one week. There is moderate circumcorneal injection. R. E., V. = $\frac{8}{10}$. Atropine is instilled into R. E., and examination shows descemetitis and a patch of exudation into the choroid, but the media are quite hazy. He is put on hydg. bichlor. gr. $\frac{1}{24}$, and potass. iod. grs. x., t. i. d. March 25th—R. E., V. (atropine) = $\frac{20}{200}$. Vitreous is more hazy, exudation in choroid larger. Double the dose of his medicine. April 24th—Vitreous clearer; the area of the choroidal exudate is about that of the disc, and it is situated 2 or 3 *mm* above the macula. The patient never returned.

No. 14.—L. F., a white girl, æt. eighteen, comes to the clinic Dec. 15, 1899. She says the L. E. became sore about a week ago after a severe attack of pain in the head; her general health is good. L. E. shows moderate circumcorneal injection, its V. = finger-counting. Atropine is instilled in L. E., and though the vitreous is too cloudy to permit a view of the fundus, a diagnosis of choroiditis, acute plastic posterior, with descemetitis, is made, and she is put on potass. iod. grs. v. t. i. d., to be increased as rapidly as possible. Dec. 23d — Stationary; potass. iod. increased to grs. x. t. i. d. Dec. 30th — No improvement; Descemetitis unchanged; L. E., V. (atropine) = $\frac{4}{200}$. Ordered mercurial and belladonna ointment on forehead at night. Jan. 6, 1900 — L. E., V. (atropine) = $\frac{8}{200}$, eccentric. Increase potass. iod. to grs. xv. t. i. d. Jan. 11th—Descemetitis almost gone. Jan. 18th—Descemetitis gone. L. E., V. = $\frac{20}{100}$, eccentric. Feb. 3d—Vitreous having cleared, the ophthalmoscope shows a large patch of atrophic choroiditis near the macula, thus confirming the diagnosis. Feb. 13th — Increase potass. iod. to grs. xx. t. i. d. L. E., V. = $\frac{8}{10}$, eccentric. Feb. 24th—Discontinue potass. iod. L. E., V. = $\frac{20}{100}$. March 3d—L. E., V. = $\frac{20}{200}$. Patient quit, worse. N.B.—Descemetitis lasted thirty-four days.

No. 15.—D. W., a white house-painter, came to the clinic Nov. 29, 1899. "There seems to be something growing over R. E." is his statement. His general health is good. Atropine in R. E. Dec 1st—Ophthalmoscopic examination of R. E. through the dilated pupil shows descemetitis plainly marked; the vitreous full of floating opacities; no view of fundus possible. R. E., V. (atropine) = $\frac{3}{100}$. L. E., V. = $\frac{10}{10}$. A diagnosis of choroiditis, plastic (duration uncertain), is made, and potass. iod. grs. v. t. i. d., to be pushed rapidly, is ordered. Dec. 21st—Has been taking potass. iod. grs. x. for some days; Descemetitis gone. Increase potass. iod. to grs. xv. t. i. d. Jan. 5, 1900—Increase dose to grs. xx. t. i. d. Jan. 27th—R. E., V. (atropine) = $\frac{20}{10}$, well. Media are now clear and the ophthalmoscope shows a large area of atrophic choroiditis in the lower and inner quadrant of the fundus in the extreme periphery. Feb. 3d—R. E., V. (atropine) = $\frac{20}{10}$. Potass. iod. increased to grs. xxx. t. i. d. The patient, about to be discharged, now informs us that he was treated at the hospital about a year ago, and a search of our old records discovers the following history: "D. W. came to the hospital Feb. 6, 1899. He says he has had pain above R. E. for the past nine days. A small granuloma is discovered on the upper portion of the bulbar conjunctiva, and an ophthalmoscopic examination reveals a large patch of pigmented atrophic choroiditis in the extreme periphery of the lower, inner part of the membrane. Feb. 8, 1899—Granuloma removed under cocaine. Feb. 24, 1899—Discharged cured of granuloma; choroiditis stationary. R. and L. E., V. = $\frac{10}{10}$." The attack of Nov. 29, 1899, was, therefore, but a recrudescence of a former one, which had been observed in a quiescent condition in February of the same year. N.B.—Descemetitis lasted twenty-one days.

No. 16.—Miss L. P., a white teacher, applied at the hospital Jan. 10, 1896. For ten days the sight of R. E. has been dim. Her general health is good. R. E., V. = $\frac{10}{10}$; L. E., V. = $\frac{10}{10}$. Homatropine for examination, which shows descemetitis and many large, flake-like vitreous opacities. She is put upon potass. iod. grs. x. and hydg. bichlor. gr. $\frac{1}{16}$ t. i. d. Jan. 20th—Slight improvement; double the dose of medicine. Feb. 24th—R. E., V. = $\frac{10}{10}$; L. E., V. = $\frac{10}{10}$. March 16th—Practically well; R. E., V. = $\frac{10}{10}$, a few letters. Ordered potass. iod., alone, grs. x. t. i. d. April 6th—Normal vision. Stopped potass. iod. and ordered tinct. nuc. vom. and tinct. gentian. co. April 27th—R. and L. E., V. = $\frac{10}{10}$. No record of any lesion in fundus. Jan. 30, 1901—An opportunity to examine the eyes of this patient presents itself: R. and L. E., V. = $\frac{20}{10}$, well. The right pupil being dilated with cocaine, a large patch (about four disc diameters in length) of atrophic and pigmented choroiditis is found in the periphery of the fundus down and slightly outward, about three disc diameters below the optic papilla.

No. 17.—(From Fuchs's *Text-Book of Ophthalmology;* translated from second German edition, p. 276, New York, 1892.)

A girl twenty-two years of age was taken sick with varicella, the pocks of which covered her entire body in great numbers. While still confined to her bed, she noticed a redness in her left eye. This passed off in a few days, but the sight of this eye had by that time become obscured. Some days after, I found the eye perfectly free from discoloration and the lower half of the cornea exhibiting a very faint opacity. Under a magnifying-glass this opacity resolved itself into innumerable very minute deposits. The pupil was rather more dilated than in the sound eye, and readily permitted examination with the ophthalmoscope, which showed a slight opacity of the vitreous in its anterior section and, in the extreme periphery of the portion of the fundus visible with the ophthalmoscope, a white spot of exudation about the size of the optic disc. Subsequently the vitreous cleared up; the spot of exudation, which in the beginning had quite indistinct outlines, became more sharply circumscribed and was gradually transformed into a pigmented area with an atrophic white spot in its centre. This exudate in the choroid was evidently the real focus of inflammation from which the opacities in the vitreous and the deposits had started. The disease itself must be regarded as a very light case of the metastatic choroiditis which is sometimes observed in consequence of infectious diseases.

Of Descemetitis with Myopic Choroiditis.

No. 18.—H. B., a negress, æt. thirty, comes to the clinic Dec. 15, 1894. She says her eyes have been bad one month; her general health is good. R. E., V. = fingers at five feet; L. E., V. = $\frac{10}{200}$. Ophthalmoscopic examination shows descemetitis, a cloudy vitreous, and myopia. A diagnosis of myopic choroiditis with descemetitis is made. Ordered potass. iod. in increasing doses. Jan. 5th—Has been steadily under treatment. Given also hypodermatic injections of strychnia sulphate and mercury bichloride. Jan. 7, 1895—V. is unimproved. Feb. 2, 1895—V. slightly improved. She has to leave the city and is directed to continue treatment at home. No view of the fundus is yet possible. The preceding, together with the following cases, comprise all the instances of descemetitis, save two, that have come under my observation since 1894. The argument for the classification chosen it is better to defer until after consideration of all the case histories.

Of Descemetitis with General Uveitis.

No. 19.—S. L., a black washerwoman, æt. twenty-five, comes to the clinic April 2, 1898, and complains of something growing over the R. E. for the past few days. R. E., V. = $\frac{8}{10}$. L. E., V. = $\frac{8}{10}$. Examination under atropine shows descemetitis and cloudiness of the media. She is ordered hydg. bichlor. gr. $\frac{1}{48}$ t. i. d. April 29th—Media clear; R. and L. E., V. = $\frac{8}{10}$. She is discharged

cured. No note is made of finding any changes in the fundus, so they were, presumably, absent.

No. 20.—J. J. B., a negro laborer, æt. thirty-nine, applies at the hospital Jan. 9, 1900. The R. E., he says, has been failing ten days; he lost the L. E. eight years ago. R. E., V. = $\frac{20}{50}$; L. E., V. = 0. Examination shows descemetitis and floating vitreous opacities. He is put on potass. iod. grs. v. t. i. d., which is to be rapidly pushed. Feb. 28th—Returns for the first time since Jan. 9th; has taken the medicine ordered for about fifteen days. To-day R. E., V. = $\frac{20}{20}$, well, and he is discharged cured. In both these cases there was slight circumcorneal injection.

No. 21.—J. P., a negro baker, seeks a consultation at the clinic on Jan. 27, 1898. He says that everything looks foggy before his R. E. and he had a pain in this eye last week. R. E. and L. E., V. = $\frac{20}{20}$, and careful examination reveals nothing abnormal. He is dismissed but told to return at once if he notices any change in the condition of R. E. Feb. 4, 1899, he returns with slight circumcorneal injection and haziness of the cornea of R. E. V., R. E., = $\frac{20}{200}$ only; L. E., = $\frac{20}{15}$. Examination with the ophthalmoscope through the dilated pupil shows descemetitis and such dense floating opacities of the vitreous that the fundus cannot be seen. Potass. iod. grs. v. t. i. d. is ordered. Feb. 5th—R. E., V. (atropine) = $\frac{5}{200}$. The dose of the iodide is doubled. Feb. 8th—R. E., V. (atropine) = $\frac{1}{200}$. KI grs. xv. t. i. d. Feb. 10th—R. E., V. (atropine) = $\frac{1}{200}$. Order KI grs. xx. t. i. d. Unfortunately the patient never returned.

No. 22.—J. A., a negress, a cook, æt. twenty-nine, comes to the hospital Feb. 10, 1898, complaining that the R. E. has felt sore and dim for one week. Examination with the ophthalmoscope, after the instillation of atropine, shows descemetitis and too many floating opacities in the vitreous to permit any view of the fundus. V., R. E., = $\frac{20}{200}$; L. E., = $\frac{20}{15}$. She is ordered KI grs. v. t. i. d., hyg. bichlor. gr. $\frac{1}{16}$ t. i. d. Feb. 28th—Dose of medicines doubled. R. E., V. (atropine) = $\frac{20}{100}$. March 21st—Potass. iod. grs. xx., hydg. bichlor. gr. $\frac{1}{12}$ t. i. d. R. E., V. (atropine) = $\frac{20}{70}$, some letters of. The patient never returns.

No. 23.—T. W. G., a negro laborer, æt. thirty, comes to the clinic Jan. 18, 1895. His L. E., he says, has been bad btweeen seven and nine days. His general health is only fair. R. E., V. = $\frac{20}{15}$; L. E. = counting fingers at two feet. The cornea is dull, and ophthalmoscopic examination shows descemetitis and many floating opacities. Atropine is instilled in L. E. and he is put upon "the mixed treatment." Patient never returns.

No. 24.—K. S., a white girl, æt. seventeen, enters the clinic on Aug. 1, 1895, and complains that the R. E. has troubled her for the past two weeks. Her general health is good. There is slight circumcorneal injection, and under homatropine descemetitis is discovered. R. E., V. = $\frac{20}{30}$; L. E. = $\frac{20}{15}$. She is ordered hydg. iod. virid. gr. $\frac{1}{2}$ t. i. d. The patient never returns.

No. 25.—W. A., a white laborer, æt. twenty-two, applies at

the hospital Nov. 21, 1898. For two weeks, he says, the L. E. has gradually become more and more clouded, but without any pain. R. E., V. = $\frac{20}{15}$; L. E. = l. p. There is moderate circumcorneal injection, and under atropine the pupil dilates irregularly. He is ordered to bathe the eye with very hot water frequently at home. Nov. 29th—L. E., V. (atropine) = fingers at one foot. Ointment of mercury and belladonna to be rubbed into the forehead at night. The patient never returns.

No. 26.—J. B., a negro driver, æt. twenty-seven, comes to the clinic April 24, 1897, complaining that his R. E. has been dim for two weeks. His general health has been good. R. E., V. = $\frac{20}{200}$; L. E. = $\frac{20}{15}$. There are moderate circumcorneal injection, pronounced descemetitis, and many floating vitreous opacities. The patient never returns.

No. 27.—J. T., a negress, a child's nurse, æt. twenty-seven, applies at the hospital on May 12, 1899. For about two weeks she has not seen well out of the R. E. There is circumcorneal injection and descemetitis, with floating vitreous opacities. R. E., V. = $\frac{20}{200}$; L. E. = $\frac{20}{15}$. Atropine is instilled at the clinic, and she is put upon hydg. bichlor. gr. $\frac{1}{48}$ and KI grs. v. t. i. d. May 18th—R. E., V. (atropine) = $\frac{20}{100}$. May 25th — R. E., V. (atropine) = $\frac{20}{70}$, doubtfully. The dose of medicines is doubled. May 27th—R. E., V. (atropine) = $\frac{20}{15}$. The patient never returns.

No. 28.—O. J., a black washerwoman, æt. twenty-four, comes to the clinic December 6, 1897. Her V. in L. E. has been troublesome for three weeks. The pupil being dilated, descemetitis and floating opacities are discovered. R. E., V. = $\frac{20}{15}$; L. E. = $\frac{20}{100}$. Dec. 7th—Atropine instilled and KI grs. x. t. i. d. ordered. R. E., V. with + 0.75 s. = $\frac{20}{20}$. Dec. 13th—V., L. E. (atropine), = $\frac{20}{100}$. The patient never returns.

No. 29.—C. B., a black cook, æt. twenty-six, first comes to the hospital on Dec. 2, 1895. R. E., she says, has been "sore" three weeks. There is no injection. R. E., V. = $\frac{20}{30}$; L. E. = $\frac{20}{20}$. Atropine is instilled in R. E., and careful examination shows descemetitis and dust clouds in the vitreous. She is ordered to bathe the eye very frequently in hot water and to take KI grs. x. t. i. d. Patient never returns.

No. 30.—A. N., a white factory girl, æt. twenty-one, comes to the clinic Nov. 4, 1895. The R. E., she says, has been troublesome for about three weeks; the sight is dim, but she has no pain. Her general health is good. R. E., V. = $\frac{20}{30}$; L. E. = $\frac{20}{15}$. The R. E. presents a slight circumcorneal injection, and after the use of atropine descemetitis is discovered. There is slight haziness of the media, and the retina and disc are indistinct. R. E., V. (atropine) = $\frac{20}{100}$, but with + is = $\frac{20}{15}$. Put on KI grs. x. t. i. d. Nov. 9th—No improvement. KI grs. xv. t. i. d. Nov. 16th —Taking KI grs. xx. t. i. d. R. E., V. = $\frac{20}{30}$. Ordered grs. xxv. of KI t. i. d. Nov. 21st—Taking KI grs. xxv. t. i. d. Seems slightly better. Patient never returns.

No. 31.—T. D., a white laborer, æt. nineteen, applies for relief

August 10, 1896. His L. E. has been sore, he says, three weeks. His general health is only fair. There are circumcorneal injection, descemetitis, a sluggish pupil, and vitreous opacities. He says that in March of 1895 he had a similar attack in R. E. R. E., V. = $\frac{10}{30}$; L. E. = counting fingers at one foot. He is put on atropine at the clinic, and KI grs. x. t. i. d. Aug. 12th—Increase the dose of medicine to grs. xxx. t. i. d. Aug. 24th—Pupil is well dilated. Patient never returns.

No. 32.—Mrs. S. J., a white woman, æt. twenty-seven, comes to the clinic Feb. 2, 1897. Her R. E. has been sore a month. R. E., V. = finger-counting at four feet; L. E. = $\frac{10}{40}$. The ophthalmoscope shows in R. E. descemetitis and large flakes of floating vitreous opacity. Ordered atropine at the clinic and "mixed treatment." March 7th—Improving. R. E., V. (atropine) = $\frac{20}{100}$. May 10th—Vitreous too hazy to permit a view of fundus. June 11th—Still unable to get a view of fundus. The patient never returns.

No. 33.—J. S., a white tenant farmer, comes to the clinic Jan. 24, 1896. He says his R. E. began to fail him last September. His health was poor last year—is somewhat better of late. He has a bad feeling in his head. The right ear is deaf with a buzzing in it. His blindness began by a cloud and floating objects before his eyes. R. E., V. = counting fingers at five feet. L. E. = $\frac{20}{8}$. There are slight circumcorneal injection, descemetitis, and dense vitreous opacities. Atropine is ordered at clinic, and KI to be rapidly pushed. Jan. 28th—Stands grs. xx. of KI well; ordered grs. xxv. t. i. d. Jan. 30th—R. E., V. (atropine) = counting fingers at ten feet. Stands medicine well; is ordered to increase the dose. The patient leaves the city and never returns.

No. 34.—J. L. N., a commercial traveller, æt. twenty-four, came to our office Feb. 28, 1901. He says that his L. E. has been dim and rather uncomfortable about one week. He has had syphilis for six months; secondary manifestations began ninety days ago. L. E. presents marked ciliary injection. There is no tenderness; the pupil is not decidedly contracted, nor the iris discolored, but there is pronounced descemetitis. Atropine is instilled. March 1st—Pupil moderately dilated; ciliary injection rather more pronounced, but iris is not discolored. With the ophthalmoscope, no view can be had of the fundus. R. E., V. = $\frac{10}{40}$; L. E., V. (atropine) = $\frac{20}{100}$, and no glass improves. R. E. presents central nubecula of the cornea. We advise our colleague, who referred him to us, and who has him under treatment, to drop one per cent. atropine in the eye every other day and to push the anti-syphilitic remedies. March 6th—Injection rather less. L. E., V. (atropine) = $\frac{20}{100}$. March 12th—With the consent of our colleague, now places himself entirely in our hands. We advise the inunction of a drachm of the mercurial and belladonna salve into the forehead nightly; KI grs. v. t. i. d., to be rapidly pushed, and the free use of the Turkish bath. April 1st—Inflammatory symptoms much abated; descemetitis is gone; the media being clear, the oph-

thalmoscope reveals no lesion in the choroid. Is taking KI grs. xx. t. i. d. April 22d—R. E., V. = $\frac{20}{40}$; L. E., V. = $\frac{20}{60}$. Javal's instrument: R. E. = 3 ax. 40; L. E. = 0.50 ax. 90; but no glass helps R. E. All injection is gone; the media are clear and there is nothing abnormal to be seen in the fundus. The patient is discharged cured. N. B.—Descemetitis lasted thirty-one days.

No. 35.—J. A. B., a white locomotive fireman, æt. twenty-two, comes to our office April 10, 1899. He says his right eye has been red and slightly painful and his sight poor for three weeks. V., R. E.,= $\frac{20}{30}$; L. E.= $\frac{20}{200}$. L. E. shows circumcorneal injection and a slightly discolored iris; atropine is instilled. The pupil being dilated, the ophthalmoscope shows in L. E. descemetitis pigment on the anterior lens capsule, and large and numerous floating vitreous opacities. He is put on KI grs. v. twice daily, to be increased daily one gr. at each dose; hg. and belladonna ointment rubbed into forehead at bedtime. May 1st—No change. Continue KI in increasing doses, but stop ointment for two weeks. May 18, 1899—L. E., V. (atropine) = $\frac{20}{60}$. Continue KI. July 15, 1899—L. E., V. (atropine) $\frac{20}{30}$. Patient never returns, but descemetitis, circumcorneal injection, and pain have all disappeared; a few small vitreous opacities still remain. No lesion in the fundus can be discovered with the ophthalmoscope at this time.

No. 36.—L. C., a white shopkeeper, æt. thirty-seven, comes to the office March 1, 1900. L. E. has been red and painful for three weeks. His physician has been instilling atropine into it five or six times daily, but the pupil is only partially dilated. R. E., V. = $\frac{20}{30}$; L. E., V. (atropine) = counting fingers at five feet. L. E. shows circumcorneal injection and a dull, thick-looking iris. The ophthalmoscope shows descemetitis and the vitreous too cloudy for a view of the fundus. T. + 1. Order KI grs. x. t. i. d., and hg. and belladonna salve on forehead at bedtime. Continue the use of atropine vigorously. March 7th—Improving; much less injection. KI grs. xx. t. i. d. March 22d—Descemetitis persists. Two small synechiæ to peripheral portion of lens; the vitreous too cloudy to permit a view of fundus. Now taking KI grs. xl. t. i. d. April 12th—Media clearing; indistinct view of fundus. L. E., V. (atropine) = $\frac{20}{200}$. April 25th—Taking KI grs. xl. t. i. d. still. July 26th—L. E., V. (atropine) = $\frac{20}{200}$. All injection gone. Media clear; no lesion to be seen in fundus. The descemetitis has also disappeared. Oct. 9th—Stopped mixed treatment. Put patient on arseniated hemaboloids with strychnia, one half oz. t. i. d. Dec. 20th—The ophthalmoscope shows all media perfectly transparent, and no lesion to be detected in fundus. Javal's instrument shows in L. E., As. = 2.50 ax. 165 deg. L. E., V. = $\frac{20}{200}$, but with — 3c ax. 75 deg. ⊃ + 0.50 s. = $\frac{20}{30}$, well. Discharged cured.

The histories of these cases are all given from notes made in the clinic at the time.

Cases 1, 2, 3, and 4 were diagnosticated as acute plastic iritis by the writer, and the diagnosis accepted by the member of the staff who treated the case, because, although the usual symptoms of pain, ciliary injection, and sluggishness of the pupil were present, there was no especial tenderness on pressure, discoloration of the ciliary region, or other symptom calling for an additional diagnosis of cyclitis. In Cases 2 and 4, the presence of synechiæ is especially noted. In no case were opacities of the vitreous mentioned, though it is clear that ophthalmoscopic examination was made in all, both from the fact that the instillation of atropine is always recorded as having preceded the finding of descemetitis, and because it is the invariable habit in our clinic to examine ophthalmoscopically all cases presenting this symptom. In Case No. 4, however, we find "ophthalmoscopic examination through the dilated pupil reveals nothing abnormal in the vitreous or fundus."

There remains, therefore, nothing in these cases to rest the diagnosis of cyclitis upon but the presence of the very symptom under consideration; if some shall insist that this is the capital symptom of cyclitis, it does not alter the strength of my contention; for it cannot be denied that acute plastic iritis was present in these cases, and I am of those who hold it to be inconceivable (see Fuchs) that there is ever iritis without involvement, to a greater or less degree, of the ciliary body.

In Cases No. 5, 6, and 7 the diagnosis of iritis and cyclitis was made, because of the greater amount of pain and tenderness, the presence of vitreous opacities, and of a certain intractability and tendency to chronicity manifested.

In Cases No. 8 and 9, the fact that the eyes had been previously affected by iritis, and were passing into that chronic condition which we know so well as the result of subacute cyclitis, does not seem to require argument.

Case No. 10 admits of no doubt. This was, beyond question, one of acute rheumatic cyclitis, in which inflammation of the iris and the formation of synechiæ were held in check by the prompt and constant use of atropine. The pain and tenderness were extreme, but it is noteworthy that no

opacity of the vitreous was ever found. The presence of pronounced retinal hyperæmia is to be marked.

In Case No. 11, the secondary neuro-retinitis was so severe as to lead to numerous retinal hemorrhages, an erroneous diagnosis being subsequently cleared away by the finding of an area of plastic choroiditis. Certain vitreous opacities having been thought to be direct results of hemorrhage from retinal vessels, the descemetitis alone kept us on the outlook for uveal complications.

The cases of plastic choroiditis posterior speak for themselves. The case of myopic choroiditis is reported to show that descemetitis is sometimes to be found in such conditions; in all probability only during periods of active exacerbation of the choroidal malady. It is greatly to be regretted that no ophthalmoscopic examination could be had at a later day, but the diagnosis admits of no possible doubt.

These cases, all presenting descemetitis as a symptom, fall naturally into three groups:

First, those from No. 1 to No. 11, with pronounced ciliary injection and severe pain, a thick, dull iris, contracted pupil, in some posterior synechiæ, in others vitreous opacities, are certainly not such as were formerly called aquo-capsulitis and keratitis punctata, or, more recently, serous iritis and simple cyclitis. Indeed I have not found them described in any of our texts.

Second, those from No. 11 to No. 18, which present all the appearances of the classical "aquo-capsulitis," "keratitis punctata," "serous iritis," or "simple cyclitis,"—circumcorneal injection, discomfort rather than pain, an unstrained, often slightly dilated, pupil, a limpid, seemingly deepened, anterior chamber, and dimness of vision,—and yet show upon ophthalmoscopic examination the well-known lesions of choroiditis posterior. These, too, with the exception of Fuchs's (a case which might well be called choroiditis anterior) I have found nowhere in the texts.

The third group, including all the cases after No. 18, is composed of such cases as have been described as aquo-capsulitis, keratitis punctata, descemetitis, serous iritis, and simple cyclitis.

The first two groups, I submit, establish my contention, that not only is descemetitis not a disease, but that it may appear as one of the symptoms in inflammation of any portion of the uvea—in iritis, irido-cyclitis, cyclitis, and choroiditis proper.

But we cannot stop here. Contemplation of these, and many similar cases, leads us to ask whether the time is not fast approaching, if it be not already here, when we should recast our nomenclature of the uveal diseases. It is not only desirable that our clinical names should connote as closely as possible the actual pathological condition for the sake of scientific exactness, but because precision of meaning must have a serious bearing on the welfare of the patient. When one is constantly reminded by the name he uses that a plastic iritis means not only involvement of the ciliary portion, but very commonly extension of the inflammatory process throughout the whole uvea, with oftentimes secondary disease of the retina and optic disc, he will perforce be more careful and anxious in his treatment and less cocksure as to the ultimate effect upon vision. We are all aware of the great differences in severity of cases of inflammation of the iris, and the destruction wrought in neglected or intractable cases, where the outcome often leads us to feel confident that "the ciliary region must have been involved." But in such cases as those from No. 1 to No. 10, inclusive, how are we to say whether we are in the presence of an inflamed iris merely, or whether the process is so extended as to require the addition of the name cyclitis? In each the severity of the injection is the same, and clearly it will not do to depend entirely upon the degree of pain and tenderness present; these will vary not only with the judgment and impressionability of each physician, but also with the constitution and susceptibility of each patient. Nor will descemetitis serve as a pathognomonic symptom; for, as we have just seen, it may accompany inflammation of any portion of the membrane; though it must usually be counted as indicating a deep extension of the process. We are driven back, therefore, upon the presence or absence of vitreous opacities, considered together with all

the other symptoms. Holding our present view of the functions of the ciliary body and of the relation of the parts of the uvea behind it to the nutrition of the vitreous, we may admit that any case exhibiting during its course pronounced ciliary injection, constant tendency to the formation of posterior synechiæ, great pain in the branches of the fifth nerve, together with more or less numerous opacities of the vitreous and a corresponding diminution of vision, especially if marked tenderness in the ciliary region be present, should always be classed as an acute irido-cyclitis. While for the sake of a distinction having an eminently practical bearing, ciliary injection, synechiæ, pain, without marked tenderness and with a clear vitreous and but slightly diminished vision, may be set down as acute iritis simply.

In the one case, we have to do with a comparatively simple condition: in the other, with one that has much greater tendency to persist and to recur, and, as a consequence, to bring about not only destruction of the visual function but of the eyeball itself. It is true that in Case No. 10, the only case I have felt justified in calling a pure cyclitis, vitreous opacities were conspicuous only by their absence; but the excessive pain and tenderness over this region, together with the intractable nature of the affection, rendered the diagnosis an easy one; and this, I believe, would be so in all such exceptional cases. The fact that the disease was of rheumatic and not of the usual syphilitic origin may have had something to do with the absence of synechiæ and vitreous opacities; though the former, I think, were prevented by the prompt and persistent use of atropine.

The truth of this matter, as others have pointed out, but even our latest and best text-books have not sufficiently insisted upon, is, the more carefully we examine cases of iritis, both with our fingers and the ophthalmoscope, the fewer cases of simple iritis we find, and the more of irido-cyclitis, and even of acute general uveitis. Indeed, it is hard to conceive of a pure iritis without cyclitis, or of a cyclitis absolutely without iritis. The connection between the minute and arbitrary divisions of the uvea is too close, their continuity too complete, to permit for a moment the absurd fancy

that there may be violent inflammation of the quarter of an inch of tissue we call the iris, while the contiguous one-sixth we denominate the ciliary body remains in perfect health. Frequently, indeed, the process does not come to a full stop at the posterior boundary of the ciliary body, but involves the choroid proper; so that in examining these cases with the ophthalmoscope we find not only vitreous opacities, but pronounced neuro-retinal congestion, or even inflammation.

That this is secondary to a spread of the inflammation to that portion of the uvea underlying the retina, it does not seem reasonable to doubt. Who would demand the interposition of a torch to enkindle a new focus in the superstructure when a conflagration is known to be raging below? Thus, while Case No. 6 seems to be clearly one in which the process, beginning in the iris, spread to the ciliary body and in all probability to the choroid also, Cases No. 10 and 11 unmistakably display extension to the retina. In fact, the secondary nature of the changes in the retina seems to be proven (as clearly as is possible) by Case No. 11, in which a large patch of choroiditis (atrophic stage) was found near the disc as soon as the neuro-retinitis had cleared away sufficiently to permit a view of the choroid. This case clinically corresponds almost exactly to the conditions found by Knies (Noyes, *Diseases of the Eye*, 1890, p. 407), post mortem, in a case of so-called serous iritis: "The whole uveal tract was involved, as well as the sheath of the optic nerve up to the chiasm. The optic nerve was inflamed, and also the retina for a small area around the papilla." Other observers have noted "unqualified neuro-retinitis" in sympathetic ophthalmia appearing as iritis or uveitis serosa (*loc. cit.*, p. 490), and Fuchs says: "The retina and optic disc are almost never free from pathological changes in irido-cyclitis, although these changes are often too insignificant to be demonstrable by clinical examination alone." The writer's experience, however, confirms the observation that cases in which we are able to discover with the ophthalmoscope the accepted changes of plastic or exudative choroiditis (posterior) never present themselves with symptoms of a high-grade inflammation of the anterior portion of the uvea

(ciliary injection, synechiæ, pain, etc.), but always under the guise of the so-called serous iritis.

There remains now to consider the third group of cases, which has long been more or less accurately known under the various names of aquo-capsulitis, keratitis punctata, descemetitis, serous iritis, or, lastly, simple cyclitis. What are these cases? As to serous iritis, clearly Fuchs is right in saying that it is a term not to be tolerated and to be wholly banished from our nomenclature. Strictly speaking, to talk of a serous inflammation of a fibro-muscular membrane like the iris is to talk pathological nonsense. If we mean an inflammation in which the process rises high enough to permit the escape of serum from the blood-vessels, but not so high as to cause a fibrino-cellular (plastic) exudation, then, in fact, no such thing ever occurs. Inflammation is a name we have all agreed to give a process in which both cells and serum (coagulable lymph) escape from overfilled vessels, causing the formation of fibrin and giving rise to a plastic, organizable exudation. We may legitimately fancy that serum alone escapes in the condition well known as hyperæmia, or congestion of the iris, but not in the so-called serous iritis. In serous iritis, although synechiæ are neither numerous, large, strong, nor constant, we do find very constantly attachment of the iris pigment to the anterior lens capsule and fine, easily ruptured synechiæ. This makes it clear that we have often to do with a hyperæmia of the iris only, but quite often with a plastic effusion, *i. e.*, an inflammation.

But it seems to me equally clear that Fuchs is in error when he calls these cases "simple cyclitis," and that in the very face of his own suggestive experience (Case No. 17). The reasons for disbelieving that the name serous iritis corresponds to any actual pathological condition apply with equal force to the fibro-muscular and highly vascular ciliary body, and we see that Fuchs, very properly, avoids the term serous cyclitis. A true serous cyclitis is impossible, and therefore anything more than a hyperæmia must be a real (plastic) cyclitis; hence "simple" would seem to be an evasive expression by which we mean to imply a low-grade inflammation marked by a moderate ciliary injection and not

characterized by any of the other symptoms which, we are agreed, shall be held to indicate actual inflammation of the ciliary body. "We cannot see this structure," says Noyes, "and our diagnosis rests upon the hyperæmia, the appearance of the iris and of the aqueous humor, on the tension, on the sensibility of the ciliary region to pressure, on the pain, on the presence of opacities in the vitreous," and, we may add, on discoloration and bulging of the ciliary portion of the sclera. Where all these symptoms are present, therefore, as in the cases of the first group, it is eminently proper that we should denominate the disease cyclitis or iridocyclitis and be prepared to combat it actively. But where only a slight injection, vitreous opacities, and an unimportant rise of tension are discovered, and pain and tenderness, discoloration, or prominence are wanting, we are not justified in affirming more than a hyperæmia, and it is neither in the interest of an exact nosology nor a correct indication of the actual pathological condition to employ the name cyclitis. I believe that in these cases (descemetitis, serous iritis, simple cyclitis) we have hyperæmia of the ciliary body and iris, going on in some instances to a condition of very mild inflammation (feeble synechiæ, slight pain, and tenderness), secondary to a more active process in the posterior portion of the uvea, the choroid proper. The milder the symptoms, the more posterior the focus of uveal inflammation is likely to be, and basing ourselves upon this belief we are often able to foretell the finding of an area of plastic choroiditis as soon as the vitreous becomes clear enough to permit an examination of the fundus (Case No. 14). I am confident that had we been afforded an opportunity to conduct many of the cases of this group (No. 3) to their termination, and to examine with the ophthalmoscope after the media had become sufficiently clear, we should have discovered unmistakable evidences of plastic choroiditis, and they would have taken their places among those of group No. 2. The identity of symptoms does not permit me to avoid this conclusion.

In some instances, of course, the focus of disease, as in Fuchs's case, would have been found well in front of the equator of the globe, and such should be known, it seems to

me, as anterior choroiditis, while those behind the equator should be distinguished as posterior choroiditis.

In those cases in which, although opportunity for ophthalmoscopic examination was afforded, we were, nevertheless, unable to find choroidal lesions, I believe these were situated just anterior to the area of the fundus visible with the ophthalmoscope. In these cases all the symptoms of inflammatory disturbance of the anterior portions of the uvea were rather more pronounced, but I cannot, as I have said, agree that they were in any way worthy to be called cyclitis. They resembled in all respects Fuchs's case, and it is readily to be seen that had the lesion in this instance been but a trifle farther forward, the distinguished master would have been betrayed into calling "cyclitis" a condition with no similarity to that painful, sthenic, and intractable disease. For these cases I would suggest the name general uveitis; for the discoloration of the iris and the fine synechiæ, the hyperæmia of the ciliary region, the slight pain or discomfort, the varying tension, the dimness of vision, the vitreous opacities and hyperæmia of the retina and disc, and often the whole history and course of the malady, assure us that this commits us to nothing of which we cannot be certain.

A consideration of the natural history of these cases will, I believe, make the justness of these conclusions still more apparent. For as such cases present themselves in practice in various stages of their course, it is not easy to disentangle the complex of symptoms.

Not counting the case of Fuchs, and the three derived from my private practice, of the thirty-two cases taken from my service at the Eye, Ear, Nose, and Throat Hospital, fourteen were of negro blood and eighteen were white; of the whole thirty-six cases seventeen were men, nineteen women. These figures are too small and too evenly divided to base a conclusion upon. The ages of thirty-two out of the thirty-six cases are known, and we find the oldest to be forty-three, the youngest thirteen, the average being about twenty-six and two-third years; showing that these affections are more common among young adults. The number of observations is too small to throw any certain light upon

etiology, though, as in all non-traumatic inflammations of the uveal coat, syphilis seems to play the most, and rheumatism the next most, important part. In all cases presenting descemetitis, in which the observation is made early enough and with sufficient care, some circumcorneal injection and slight—often very slight—dimness of vision will be detected. It would seem from Case No. 21, which I was fortunate enough to observe before any objective symptoms made their appearance, and from like experience in similar cases without descemetitis, that a little falling off in the sharpness of sight first attracts the attention of an observant patient. In Case No. 21, this preceded by at least five days the appearance of the injection and descemetitis. That both the disturbance of vision and the injection may antedate the appearance of the descemetitis, is clearly established by Cases No. 6, 10, and 17. Indeed, Case No. 6 and that of Fuchs show that the injection may have wholly disappeared by the time the descemetitis is discovered. It is also sure that the descemetitis may endure long after all injection has faded away (Case No. 29). The duration or persistence of the descemetitis varies very greatly. In Cases No. 6, 7, 11, 14, 15, 34, in which this point was closely watched, the descemetitis lasted 24, 70, 21, 34, 21, and 31 days, respectively.

These cases will, if properly cared for, take one of several courses:

1. The symptoms, having persisted without material change for a week or more, subside, disappear completely, and leave the eye entirely restored to its normal condition (Cases No. 19 and 20. Incipient uveitis seems to me the best name for such cases, as it commits us to nothing which we do not know.

2. The injection becomes severe, the pain serious; it is hard to keep the pupil dilated; posterior synechiæ form and are hard to break up. In typical cases the vitreous remains clear, even though there is evident neuro-retinal hyperæmia. Gradually the symptoms fade away and in the course of from three to twelve weeks are gone, leaving the eye, with the exception perhaps of a synechia or two or a little pigment

on the lens capsule, anatomically and functionally perfect (Case No. 4). I cannot call such a case anything but an acute iritis, even though descemetitis be present.

3. The symptoms are much the same as in the case last described, but the injection and pain are of a higher pitch, and there is marked tenderness; the pupil may be more readily kept dilated and there may be less tendency to synechiæ. Opacities are the rule, but the vitreous may remain clear. Recovery from the attack is slow, often with many vexatious relapses, but the eye is finally restored to health (Case No. 10). These must be cases of cyclitis. They are often more or less combined with the preceding as cases of irido-cyclitis. In both instances it is rarely we catch the case in its very earliest stage.

4. In this group the circumcorneal injection and slight pain or sense of discomfort are soon gone, but the vision grows dimmer and dimmer. After a more or less protracted time, the vitreous becomes much clearer, perhaps perfectly clear, and the ophthalmoscope reveals the pigmented, atrophic spot characteristic of a past plastic choroiditis (Cases No. 11–17). Sometimes the choroidal focus is found posterior, sometimes anterior, to the equator of the globe, and the names plastic choroiditis posterior or anterior seem correct. Sometimes in exactly similar cases ophthalmoscopic examination reveals nothing; often the patients leave us before the vitreous is clear enough for a proper examination; but I cannot consent to call these cases cyclitis; the name acute general uveitis seems much more judicious.

5. Finally, in certain cases, usually neglected or improperly treated, the injection persists, growing perhaps somewhat more marked; many synechiæ form insidiously; the vitreous grows opaque and sight becomes quite bad, the aqueous and iris muddy and dull; exudates appear in the pupil; the periphery of the iris is retracted and the bulging membrane and crater-shaped pupil of exclusion are seen; the tension, at first too high, sinks too low, and chronic atrophy of the globe terminates the process (Case No. 33). Case No. 9 was just beginning to fall into this condition when first seen. There appears to me to be much more here

than is connoted by the name chronic cyclitis. Subacute or chronic general uveitis, would seem in the present condition of our knowledge, to represent much more closely what pathological research has shown to be the actual condition.

Conclusions:

1. There cannot be any such disease as "serous iritis." It is equally impossible to conceive of a serous cyclitis or choroiditis. "Simple" cyclitis would seem to be a term of evasion.

2. Descemetitis, upon which the diagnosis of serous iritis was long made to rest, is a symptom which sometimes appears as an accompaniment of a focus of acute inflammation in the iris, ciliary body, or choroid.

3. Descemetitis may also appear in cases of uveal disease so slight and evanescent that we are unable to determine in what portion of the membrane the focus may be situated; in such cases we cannot make our diagnosis more precise than is indicated by the term incipient uveitis.

4. Descemetitis appears also in certain cases of subacute or chronic uveitis, in which it is impossible to determine the precise site of the focus, but such inability by no means justifies the diagnosis of simple, subacute, or chronic cyclitis.

5. More exact and extended observation will, probably, show descemetitis to be most frequently the principal symptom of the outbreak of an acute plastic (exudative) choroiditis; this being overlooked because too few cases of iritis or cyclitis are subjected to careful ophthalmoscopic examination after recovery and the complete disappearance of vitreous opacities.

6. Many cases, not to be distinguished clinically from such cases of acute plastic choroiditis, show upon examination with the ophthalmoscope, after complete recovery and clearing of the vitreous, no evidence of lesion in the choroid; in these it is reasonable to suppose the choroidal focus to be so peripheral as to be out of the field of observation with the instrument.

7. Plastic (exudative) choroiditis often appears under the clinical picture of the so-called serous iritis, but such cases usually present themselves for observation after the stage of circumcorneal injection and descemetitis has passed away.

A CASE OF ENDOTHELIOMA OF THE LACHRYMAL GLAND (MYXO-CHONDRO-ENDOTHELIOMA CYLINDROMATODES), WITH AN ANALYSIS OF PREVIOUSLY REPORTED CASES OF LACHRYMAL GLAND TUMORS [1]

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(*With two text illustrations.*)

NEW growths of the lachrymal gland are of such infrequent occurrence that but scanty attention has been accorded them from the purely pathological side, and our knowledge of the histological structure of these tumors is consequently in a very incomplete and confused state. The earliest reported cases were diagnosed by their clinical characteristics only; and in the majority of later ones where a microscopical examination was made it was of such an incomplete nature that the descriptions given leave us in doubt as to the exact structure of the growth. In many cases the observers even have been unable to satisfy themselves as to the correctness of their diagnosis; and in a number of instances where the original growth or its recurrence was again examined the second diagnosis did not accord with that first given. As a result of classifications and generalizations based upon errors of this nature, certain misconceptions concerning the pathology of lachrymal tumors have arisen and remain in the literature to be quoted from time to time as being of conclusive authority. An example of

[1] From the Pathological Laboratory, University of Michigan, Ann Arbor, Mich.

this may be given in the case of Becker, who in 1867 made the first microscopical examination of a tumor of the lachrymal gland. From this one case, which he diagnosed as an "adenoid," Becker concluded that the majority if not all of the cases of lachrymal tumor which had been previously reported as scirrhus, encephaloid, myxoma, sarcoma, hypertrophy, etc., were but different stages of the one form. This view was accepted by numerous observers, and though a later study of Becker's specimen yielded a diagnosis of cylindroma Becker's paper has up to the present day continued to be referred to as a chief authority on the structure of lachrymal tumors, and adenoid and adenoma to be regarded as the most common variety of lachrymal neoplasm. The case of Schirmer is similar to that of Becker. The former diagnosed a lachrymal tumor as an "adenoid" and made even more sweeping statements than Becker, to the effect that all lachrymal tumors were "adenoids." Schirmer's tumor was afterwards declared to be a carcinoma, but his generalizations published in the handbook of Graefe and Sämisch were widely accepted.

Since the pathology of lachrymal neoplasms has seemed to be in a chaotic state, and further because so few of these tumors have been adequately examined and described, the writer has seized the opportunity offered by the following case to make a thorough study of the growth with a view of fixing its histological character as a basis for a better classification of lachrymal tumors. In connection with this it has been necessary to make a critical review of the literature of this subject.

History of case.—Mr. D. H. P., farmer, aged forty-five, was admitted to the University Clinic of Ophthalmology (Dr. Carrow) on January 12, 1901. His family and personal history were negative. Five years ago he had first noticed a bulging of the right eye, which increased gradually until there was marked exopthalmus. During the last two years the increase in size has been slow. Vision in right eye $\frac{1}{120}$, in left eye $\frac{11}{10}$. Neuro-retinitis and interstitial choroiditis were present in right eye. A diagnosis of orbital tumor was made, and the operation for its removal performed by Dr. Carrow. The outer canthus was divided and the conjunc-

tiva incised over the tumor. This was found to be a mass about the size of a walnut, lying well back in the orbit in the lachrymal-gland region, but its exact relations to the gland could not be definitely determined. Over the growth there was a thick layer of fat. It was removed with ease by shelling it out from its bed of fat. There was but little bleeding and the eye was uninjured. The wound healed quickly, the extreme exophthalmus which was present before the operation entirely disappeared, and there was some improvement of vision in right eye. The patient was discharged January 20th. No report of any recurrence has been received.

The tumor was sent to the pathological laboratory for examination. It was fixed in alcohol and mercuric chloride, imbedded in paraffin, and stained by the usual methods.

Gross appearances.—The growth was almost round, hard and firm, and about the size of a large black walnut. On section it was found to possess a thick capsule of dense hyalline connective tissue, from which trabeculæ of a similar tissue passed into the growth giving it somewhat of a lobulated appearance. Between these trabeculæ the appearance of the cut surface varied greatly, in areas being firm and white like cartilage, in other portions translucent and jelly-like, while still other areas were yellowish, granular, and of a crumbling consistency. A few small reddish spots were scattered over the surface. Immediately beneath the capsule the peripheral portion was pinkish, more homogeneous, and of softer consistence.

Microscopical Examination.—Sections were cut so as to include a portion of the tumor from its capsule to its centre. The capsule consists of numerous concentric layers of coarse hyaline connective tissue, having but few nuclei and being poorly supplied with blood-vessels. Just beneath the capsule there is a narrow area, extremely rich in large spindle cells, many of which, being cut transversely, appear round. These cells lie in a hyaline intercellular substance, and for the greater part line narrow and irregular clefts which appear to be either lymph spaces or blood capillaries, some of them containing blood, which lies in direct contact with these cells, but the majority of the spaces are empty. In many areas the spindle cells are so closely packed together as to obliterate the spaces and give the appearance of a spindle-cell sarcoma. The transition stages between the endothelial cells of the small vessels and the large atypical cells forming sarcoma-

like areas are so clearly evident that the latter must be regarded as being of endothelial origin. Therefore, if the character of the growth were judged by the structure of the peripheral portion, the diagnosis would be that of spindle-cell endothelioma.

Toward the centre the spindle cells decrease rapidly in number, while the hyaline intercellular substance becomes greatly increased in amount. Just beneath the peripheral cellular zone there are scattered gland spaces, lined with short columnar or cubical epithelium, similar to that of the lachrymal gland. Many of these glands are very irregularly branched, some are cystic, and nearly all contain a colloid substance. A few of these glands are found also in the peripheral zone, but they are most numerous toward the centre, where some areas present the appearance of normal lachrymal-gland structure. Many of the gland spaces near the centre of the growth are very large and cystic, their lining epithelium more flattened, and are partly or wholly filled with a granular or homogeneous colloid material. In some areas the spindle cells are numerous between the gland spaces, while in others the interglandular tissue is myxomatous in character, or homogeneous and hyaline, containing very few cells or none at all. In scattered areas hyaline cartilage, undergoing myxomatous degeneration, is found between the glands. There are also scattered throughout the growth large areas containing no glands, and consisting entirely of either myxomatous tissue, cartilage, or hyaline connective tissue.

About many of the glands the hyaline tissue is arranged concentrically, particularly about isolated glands whose epithelial walls are pressed together, obliterating their lumen. An intraglandular growth of connective tissue is also seen in some of the large cystic glands. Numerous remains of obliterated and atrophied glands can be seen in the transition boundary between the portions containing numerous glands and those hyaline areas in which few or none are present. The larger blood-vessels of the growth show a marked proliferation of the intima, either partly or wholly obliterating the lumen. About such vessels there is also in many cases a concentric arrangement of hyalin. The appearances can be interpreted only as an active overgrowth of the stroma leading to compression and atrophy of the glands, the interstitial tissue assuming either a hyaline or myxomatous character or undergoing a metaplasia into cartilage which suffers a later myxomatous change. The enlargement and cystic dilata-

tion of a portion of the glands may be explained as being due to an obliteration of the excretory ducts caused by the overgrowth of the interstitial tissue. The colloid substance found in the gland spaces is also further evidence of retention of secretion.

Diagnosis.—The character of the gland spaces in the tumor and its location make it certain that the growth is a primary tumor of the lachrymal gland. The first portions taken for a quick diagnosis for the clinician were from the central part, and from the structure found there a diagnosis of myxofibroadenoma of the lachrymal gland was returned. Further study of sections taken from other parts of the tumor showed the presence of myxomatous cartilage in the peripheral cellular zone. From the great variety of structure shown in different areas, the examination of single sections taken from different places might yield a corresponding variety of diagnoses. In harmonizing all of these different appearances, the results of my study have led me to consider the tumor as being primarily an overgrowth of the endothelial cells of the lymph-spaces, lymph-vessels, or of capillaries; following this proliferation there is an overformation of intercellular substance, causing atrophy of the cells, and a coincident or later metaplasia into cartilage or myxomatous tissue. As a result of this interstitial formation of new tissue the gland spaces are either compressed and obliterated or, through earlier obstruction of the excretory ducts, become cystic. There is probably also a certain amount of hyperplasia of the glandular elements, but not sufficient to warrant the diagnosis of adenoma. The cellular area at the periphery is to be considered the most recent, or the developing portion of the tumor, its increase being, therefore, by expansion. The large amount of hyalin in many areas and its characteristic arrangement suggests at once the cylindroma, but this designation cannot be applied to the growth as a whole. It is evident that we are dealing here with a peculiar *mixed tumor*, containing myxomatous tissue, cartilage, cylindromatous and sarcomatous areas, and we are at once reminded of the exactly similar tumors of the parotid. A comparison with these shows this tumor of the lachrymal gland to be identical in structure

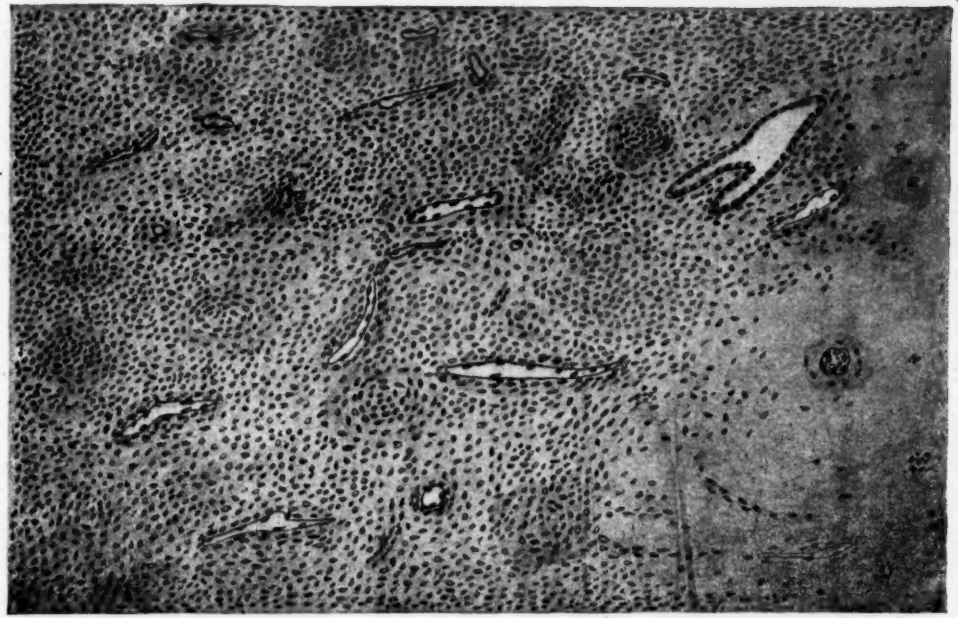

FIG. 1.—From cellular peripheral portion of growth, resembling a spindle-cell sarcoma. Hyaline intercellular substance; numerous lymph- and blood-vessels whose walls are formed by tumor-cells. In upper, right corner one gland. To the right, area of marked hyaline change with few cells. Camera lucida drawing; Leitz Obj. No. 3, Eyepiece No. 4. Reduced one third.

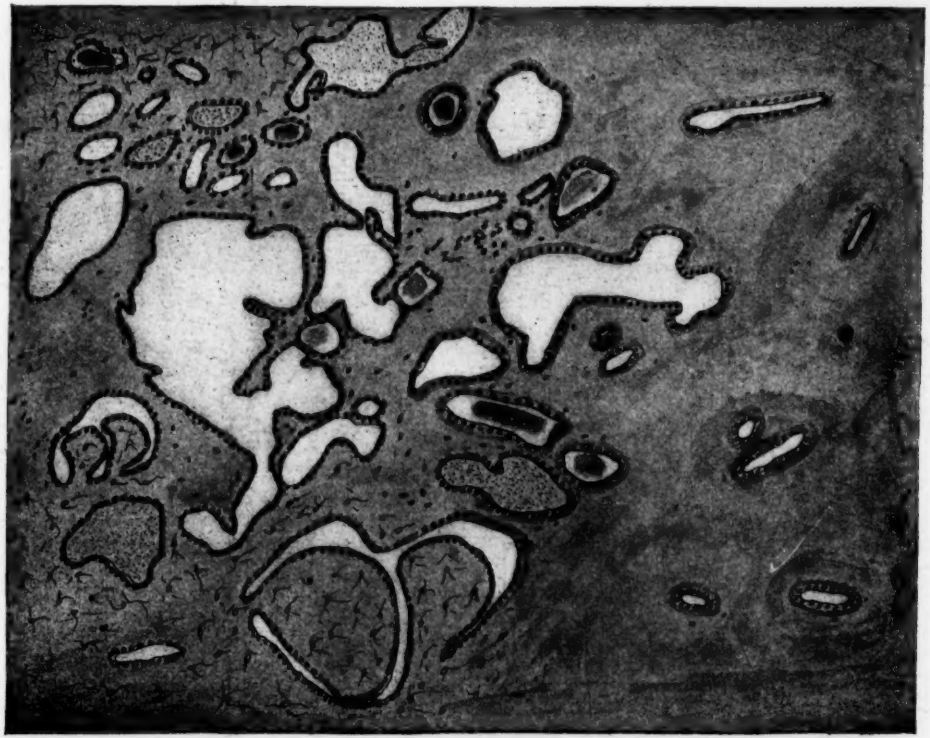

FIG. II.—From central portion of tumor. Dilated glands, some containing colloid and granular material. Stroma showing both myxomatous and hyaline changes. To the right, hyaline stroma containing few nuclei and scattered atrophic glands. Camera lucida drawing ; Leitz Obj. No. 3, Eyepiece No. 4. Reduced one third.

with the mixed tumors of the parotid and submaxillary glands, and it must be put into the same class with these. The terminology of the parotid tumors is, however, in a very confused state, and the mixed tumors are described in the literature under the heads of cylindroma, chondrosarcoma, myxosarcoma, myxochondrosarcoma, chondrocarcinoma, chondrosarcoma endotheliale, endothelioma, etc. The present tendency is to consider all of these various forms of mixed parotid tumors (about 75 % of all parotid tumors) as of endothelial origin, and the term endothelioma has come to be used as a collective designation for all of them.

In accordance with its histogenesis (the cells lining the lymph-spaces, small lymph channels, and small capillaries) the growth of the lachrymal gland described above is diagnosed as an endothelioma. To indicate more clearly its histological structure it may be styled a myxochondro-endothelioma cylindromatodes. The clinical significance of this growth would be similar to that of the parotid endotheliomata, except that the location of the lachrymal growth would make the effects of pressure much more important. Like the parotid tumors lachrymal growths of this nature would form slowly progressive tumors, often a history of development extending through several years or longer, painless in themselves, showing little tendency to become malignant, their chief effects those of pressure, and when thoroughly removed showing but little tendency to recur.

Historical.—Tumors of the lachrymal gland were mentioned for the first time in the latter part of the sixteenth century, being known to H. v. Aquapendente and Fabricius Hildanus. The latter in his *Observationes Chirurgicæ*, 1598, speaks of a large tumor of the lachrymal gland with extension into the conjunctiva of the upper eyelid which he had successfully treated. Demours, in 1741, Boerhave, 1749, Warner, 1752, Himly, 1807, and Guérin in 1808, reported cases of lachrymal-gland tumor which they diagnosed as scirrhus.

The presence of primary scirrhus of this gland was, however, denied by a large number of ophthalmological writers

in the early part of the nineteenth century, notably J. Adams Schmidt, who held that all cases of scirrhous or carcinomatous growths of the lachrymal gland were secondary extensions from the eyeball, orbital tissue, or bone. Desault, Roux, Velpeau, Bérard, and Mackenzie upheld this view. But Beer, in 1817, corrected many of Schmidt's errors and proved the existence of primary "scirrhus" of the lachrymal gland. Travers, Portal, Warner, Guérin, Todd, O'Beirne, Guthry, Himly, Chelius, Jüngken, and others agreed with Beer in his view that "scirrhus" could develop primarily in the lachrymal gland and be confined to it alone for a long time without involving any of its neighboring structures.

In 1833 cases of medullary fungus were observed by Tortual and Aumüller. Lawrence and Maslieurat-Lagémard, in 1840, reported cases of "scirrhus," and Crampton, in 1846, an undiagnosed "tumor of lachrymal gland." In 1847 cases of "scirrhus" and "hypertrophy" were seen by Pigeolet and Pemberton respectively, and in the same year a case of two lachrymal tumors in the same individual was observed but not diagnosed by Auzias-Turenne. Anderson and Lundberg, in 1848, reported a case of "hypertrophy" and one of "scirrhous disease," and Halpin a case of fibroma. Gluge, the same year, reported a case of "hypertrophy" and in 1850 one of carcinoma. A "fibro-plastique" growth was described by Lebert in 1851; in the next year Desmarres reports an adenoma removed by Chassaignac, and Bertherand a "cystic tumor." In 1854 a case of scirrhus was seen by King.

Two cases of lachrymal "hypertrophy" were reported by Busch in 1854; a case of "scirrhus" by Cowling in 1855; and in 1856 a case of chloroma by Mackenzie. (Tumors probably similar to the latter are mentioned by Burns, Balfour, Halpin, and Pemberton.) Cases of "hypertrophy" were described by Warlomont and Fano in 1862, Wharton-Jones in 1864, Rothmund and Lentenneur in 1865. In the latter year Knapp reported a case of "adenoid combined with cancroid," and Mackenzie a case of "encephaloid."

A case of lachrymal sarcoma was observed by Stengel in 1866; of "adenoid tumor" by Becker in 1867; of myxoma

by Sautereau in 1870. In the same year Adams described a "primary cancroid" which later was called lymphoma; Emmert two cases of sarcoma, and Horner a secondary carcinoma from a primary in the mammary gland. Arnold and Becker, in 1872, reported a case of lymphadenoma affecting both lachrymal glands; and in 1873 Gallasch saw a case of leucæmia in which both lachrymal glands were enlarged. In the St. Bartholomew Hospital Reports for the same year there is a description of a cartilaginous tumor of the lachrymal gland removed by Vernon.

In 1874 Alexander observed a case of sarcoma of both glands; Mooren, in the same year, a case of fibroma and another one of carcinoma of both glands; and Savary a case of lymphadenoma. In 1875 Butlin reported a "rare case of enchondroma" of the lachrymal removed by Vernon, and Nettleship a case of round-cell sarcoma. A case of "adenoma in transition to cancroid with fibro-cartilaginous stroma" was observed in 1876 by De Vincentiis. Epithelioma of the lachrymal gland was reported by Lyman in 1877; and in the same year a sarcoma of the gland combined with gliosarcoma of the eyeball by Dom. Medero. During the year of 1878 lymphadenoid sarcoma was observed by Weinlechner, two cases of lymphoma by Berlin, two cases of carcinoma by v. Forster, and a case of myxoadenoma by Quagliano and Guaita. In Salles's dissertation on lachrymal tumors, 1880, references are made to cases of fibroma of the lachrymal gland observed by Halpin and O'Beirne. In this same year Knapp reported three cases, myxoadenoma, myxoadenoma carcinomatosum, and a recurring carcinoma; Johnston an adenoma, and Mollière a case of "colloid epithelioma."

A case of adenoma was seen by Alt in 1881; in the same year a glandular carcinoma by Grossmann, and an undiagnosed tumor by Dobrowolsky. In the following year cases of spindle-cell sarcoma, encapsulated fibrosarcoma, sarcoma, and myxoadenosarcoma were reported by Harlan, Power, Knapp, and White respectively. In 1883 Huber described three cases of lachrymal growth, adenoma, round- and spindle-cell sarcoma; and in the same year cases of round-

cell sarcoma and primary carcinoma were reported by Bock and Ludwig.

In 1884 Keyser reported cases of "adenoid" and round-cell sarcoma, and Figos an adenoenchondroma. During the next year, a sarcoma was observed by Alt, two cases of enchondroma myxomatodes by Alt and Aub, and a cystic tumor of the palpebral portion of the gland by Alvarado. Debierre in 1886 reports three cases of simple hypertrophy, and Adams Frost a case of symmetrical swelling in the region of the lachrymal glands, which he considered similar to Power's case of fibrosarcoma. The latter observer reports also in this year a case of symmetrical enlargement of both lachrymals, one of which on removal showed a "hypertrophy of fibrous tissue." A cylindroma was reported by Aievolo in 1887. In 1888 Dor demonstrated a dermoid tumor of the orbit, which showed a lachrymal gland otherwise normal covered with hairs. In the same year De Britto observed a large fibrosarcoma arising from the accessory lachrymal gland, and Mazza a case of adenoma showing "hyaline-colloid degeneration and cancroid structure."

During 1889 two cases of adenoma were seen by Snell, an adenoma by Socor, an adenosarcoma by Bull, a round-cell sarcoma by Adler, and a case of "lymphatic hyperplasia" by Haltenhoff. In 1891 Giulini described a round-cell sarcoma affecting both glands, Fuchs and Zirm a case of lymphoma of both lachrymals and parotid glands, Moecke a large round-cell sarcoma with hyaline areas, Du Bois-Reymond a sarcoma, and Foster a cystic tumor (retention-cyst?).

A fibroma was reported by Köhler in 1892, lymphosarcoma (?) by Mikulicz; also a case of simultaneous tumor of lachrymal and parotid by De Wecker. During the following year two cases of simultaneous tumors of lachrymal and parotid were seen by Snell, a sarcoma by Sgrosso, "enlargement" of both glands by Sandford, and two cases of sarcoma by Lawford. In 1895 Piazzi described a case of adenoma, and Bull one of adenosarcoma. In 1896 Pick reported a case of adenosarcoma, and Bronner one of sarcoma which he thought might be congenital. In the same year, Alt describes three lachrymal tumors in addition to those

already reported by him (making seven, in all, seen by him), chondrosarcoma, and two cases in which the growth consisted chiefly of myxomatous and cartilaginous tissue (myxochondroma?).

In 1897 Jennings observed a case of scirrhous carcinoma, Scott and Haas cases of sarcoma, and Alt an undiagnosed growth of palpebral lachrymal. In 1898 De Schweinitz described an angioma cavernosum which probably had its origin in the lachrymal gland, and refers to one mentioned clinically by von Graefe in 1866. A case of fibrolipoma of the accessory lachrymal gland reported by Bull and one of myxosarcoma by Werner in 1898 are apparently the last observations of lachrymal tumor up to the present time.

Eliminating all cases of undoubted inflammatory enlargement, tuberculosis, syphilis, trachoma, retention-cysts, hydatids, etc., I have been able, after a most exhaustive search through the literature, to find only the 132 cases of lachrymal tumor reviewed above. Grouping these according to the diagnosis given by the original observer, they fall into the following pathological classes:

Hypertrophy	13	Chloroma	3
Fibroma	4	Leucæmic tumor	1
Fibroplastique	1	Lymphadenoma	2
Fibrolipoma	1	Lymphoma	3
Fibrochondroadenoma	1	Lymphadenosarcoma	1
Fibroadenoma	1	Lymphatic hypertrophy	1
Myxoma	1	Myxosarcoma	1
Myxochondroma	2	Myxoadenosarcoma	1
Myxoadenoma	2	Adenoid	2
Chondroma	4	Adenoma	13
Chondroadenoma	1	Adenoma with cancroid	1
Angioma	2	Cancroid	1
Sarcoma	14	Carcinoma	6
Round-cell sarcoma	7	Scirrhus	13
Spindle-cell sarcoma	2	Medullary cancer	2
Adenosarcoma	2	Encephaloid cancer	1
Fibrosarcoma	1	Epithelioma	1
Cylindroma	1	Glandular cancer	1

Colloid epithelioma	1	Symmet. swelling	1
Secondary cancer	1	Enlargement	1
Myxoadenocarcinoma	1	Fibroid hyperplasia	1
Enchon. myx. carcinomatodes	2	Undiagnosed	5
Cysts	3	Total	132
Dermoid cyst	1		

In glancing over the above classification, one is struck with the fact that more than two thirds of the neoplasms of the lachrymal gland are of mesoblastic origin. This proportion is really much greater if we consider that so many of the diagnoses of lachrymal tumor were based upon clinical appearances, and that some, at least, of the hard growths called "scirrhus" were most probably connective-tissue tumors. If we take into account only the cases in which the diagnosis was made from the microscopical findings, the proportion of mesoblastic tumors is raised still higher. Further, in many of the cases diagnosed as adenoma, myxoadenoma, etc., the observer was very much in doubt as to whether the tumor consisted of a glandular or interstitial overgrowth. This uncertainty as to the histogenesis of lachrymal neoplasms is shown very early in the history of their pathology and has continued up to the present time.

The first microscopical study of a lachrymal growth was made in 1867 by Becker in the case of a tumor which he had removed from the orbit of an eighteen-year-old girl. This he describes as an overgrowth of both glandular and interstitial elements, and designates it an "adenoid," but emphasizes the fact that it was a mixed tumor, an "adenoid" (adenoma) combined with a cancroid of the interstitial tissue. A similar conclusion was reached in the cases of Knapp and Mazza; and also those reported by Gluge, Warlomont, and Lebert, under the head of hypertrophy and fibroplastique, were considered to be "adenoids," though histological proof of this was wanting.

Schirmer, following up Becker's argument, held it to be very probable that all of the tumors of the lachrymal gland which had been described as simple hypertrophy, adenoid, colloid, sarcoma, myxoma, fungus medullaris, and encepha-

loid were but different stages of one form of neoplasm, and should all be classed as "adenoid." He believed, after a study of the cases of Gluge, Busch, Wuth, Warlomont, Rothmund, Lentenneur, Fano, Savary, Sautereau, Knapp, Mackenzie, Alexander, Adams, Horner, and Mooren, that the tumors reported by these observers corresponded to the one of Becker's case, and that all should be called "adenoids." Schirmer's work was, however, only critical; none of the cases was re-examined microscopically. The tumor described by him as an "adenoid" was one removed by Horner, and was afterwards declared by Eberth to be a secondary carcinoma.

Koester critically reviewing Becker's and Busch's cases concluded that the tumors were cylindromata arising from the proliferation of the endothelium lining the lymph spaces, the glandular epithelium taking no active part. Berlin accepted this view and placed the cases of Todd, O'Beirne, Bérard, Lawrence, de Vincentiis, and Butlin in the same class. From Koester's description I have no doubt that the tumors of Becker and Busch correspond to the one in my case. They are therefore to be classed as endotheliomata and those cases believed by Berlin to be cylindromata would fall also into this class.

Very few observers, however, appear to have been aware of Koester's or Berlin's work, and lachrymal tumors have continued up to the present time to be reported as uncertain types of mixed tumor, adenoma, etc., when it is apparent from the descriptions given that the majority were in reality cases of endothelioma. But only one case originally diagnosed as cylindroma appears in the literature, and I have not been able to find a single case of lachrymal tumor reported as endothelioma. It seems strange that no one should have earlier pointed out the similarity existing between lachrymal and parotid tumors.

Lacking the re-examination proof, and since reliance cannot be placed upon many of the descriptions, it would not be safe to say positively that all of the variously diagnosed mixed tumors of the lachrymal were endotheliomata. But there can be but little doubt that in all of those cases in

which cartilage, hyaline, and myxomatous tissue were present in the growth the neoplasm was similar or identical with the mixed tumors of the parotid. No doubt at all can exist of this identity in such cases as the "sarcoma carcinomatodes with mucoid change" of Werner, the adenoenchondroma of Figos, the cases of Alt, etc. Five of the seven cases of lachrymal tumor seen by the last observer were regarded by him as arising from the interstitial connective tissue. They consisted chiefly of myxomatous and cartilaginous tissues, and I have no doubt were endotheliomata. The high proportion of the occurrence of these tumors in this case is very significant when we consider the proportion which they bear to the whole number of reported cases of lachrymal tumor.

Without giving here an analysis of each reported case, it seems to me highly probable, after a critical study of the literature, that the great majority of lachrymal neoplasms are mixed growths of endothelial origin similar to the case described above, and should therefore be classed as endotheliomata, to accord with the similar tumors of the parotid. The pathological history of the tumors of the lachrymal gland repeats that of the tumors of both parotid and submaxillary. Until very recently the mixed growths which form the great majority of parotid tumors were described under various heads, as chondroma, chrondrosarcoma, myxochondroma, sarcoma carcinomatodes, etc.; but the studies of v. Ohlen, Kelly, and others have shown that these growths arise from the flattened cells lining the lymph-spaces and they have accordingly been termed endotheliomata. Much less work has been done in the case of the submaxillary tumors. A hasty survey of the cases of submaxillary neoplasm mentioned in literature shows a striking predominance of mixed tumors containing cartilage or myxomatous tissue, and from the descriptions given I consider them to be similar to the parotid growths. A few tumors containing cartilage have also been found in the isolated salivary glands of the lip.

The serous glands (parotid, lachrymal, and submaxillary) appear then to possess a common type of neoplasm peculiar

to them and forming the great majority of all the primary growths of these glands. Why these glands should so frequently give rise to endothelial tumors containing cartilage, hyaline, and myxomatous tissue is not apparent. The presence of cartilage in the parotid tumors has been explained as due to congenital inclusions of cartilage, but this theory cannot be applied to the lachrymal gland. At present we can only say that the stroma of these glands, either from properties inherent in itself or from retrograde changes in the endothelium lining its spaces, possesses a marked tendency to the formation of cartilage, hyaline, and myxomatous tissue. Since the interstitial substance of the stroma is undoubtedly formed by its cells it is possible that these processes may represent individual properties of secretion on the part of the cells lining the tissue-spaces. It is worthy of note that the cartilage found in these growths is almost always undergoing myxomatous change.

As to the etiology of the serous-gland endotheliomata nothing definite can be said. A point of great interest is the simultaneous occurrence of tumors of the lachrymal and salivary glands. Such cases have been reported by Snell, Fuchs, Haltenhoff, Mikulicz, De Wecker, and others. In Haltenhoff's case the lachrymal, parotid, and submaxillary were affected. Following mumps there is not infrequently an inflammatory enlargement of both lachrymal and salivary glands, but in the cases referred to the enlargement of both glands simultaneously was due to a neoplasm. The coincidence might indicate a common etiology. The clinical characteristics of all the serous-gland endotheliomata are identical. They occur most frequently in early adult life, form painless tumors, of slow growth, are usually capsulated, rarely become malignant, produce pressure effects chiefly, and when completely removed show little tendency to recur. It must be borne in mind, however, that in rare instances they may become sarcomatous or carcinomatous.

In conclusion:

1.—The great majority of the lachrymal tumors described in literature under widely differing heads are most probably mixed tumors of endothelial origin similar in structure to

those of the parotid and submaxillary glands. These tumors form a type peculiar to the serous glands and differ from the endotheliomata found in other parts of the body in their tendency to form cartilage, hyaline, and myxomatous tissue, and in their relatively slight malignancy.

2. Histogenetically they arise from the flattened endothelium of the lymph-spaces, and hence are called endotheliomata, but their peculiar characteristics warrant the employment of some special designation. The use of the term endothelioma in itself appears somewhat misleading in view of the fact that endotheliomata elsewhere are of the nature of sarcoma and are for the greater part very malignant. These growths partake more of the nature of mature connective-tissue tumors. The designations, myxochondroma endotheliale, chondroma endotheliale, etc., might be employed as the case warranted to indicate both histogenesis and structural characteristics of the growth in the absence of any specific term for the cells lining the tissue-spaces or the tumors derived from them.

BIBLIOGRAPHY.

ADAMS, *Brit. Med. Jour.*, 1870, p. 431.

ADLER, *Wiener klin. Wochensch.*, 1889.

AIEVOLO, *Riv. Internaz. di Med. e Chir.*, Napoli, 1887.

ALEXANDER, *Klin. Monatsblaett. f. Augenh.*, 1874.

ALT, Thirty-first Convention of Amer. Med. Assoc., 1881; *St. Louis Med. and Surg. Jour.*, 188; *Med. Rev.*, St. Louis, 1896; *Amer. Jour. of Ophth.*, 1897.

ALT and AUB, *Amer. Jour. of Ophth.*, 1885.

ALVARADO, *Rev. de cien. med.*, Barcelona, 1885.

ANDERSON and LUNDBERG, *Annal. d'oculist.*, vols. xix. and xxii.

V. AQUAPENDENTE, Pröhl's cit.

ARNOLD and BECKER, ARCH. OF OPHTH., 1872.

AUMÜLLER, *Diss.*, "De glandulæ lacrymalis fungo medullaris," Berlin, 1833.

AUZIAS-TURENNE, *Annal. d'oculist.*, 1847.

BECKER, *Med. Jahrbücher*, Bd. xiii.; *Bericht. Augenklin. d. Wien. Hochsch.*, 1867.

BEER, *Leitfaden über Augenkrankheiten*, Wien, 1817.

BERLIN, *Handbuch, Graefe u. Sämisch*, Bd. vi.

BERTHERAND, *Rec. de mém. de méd. milit.*, Paris, 1852.

BOCK, *Wiener med. Presse*, 1883.

BOERHAVE, *Abhandlung v. Augenkrankheiten u. ders. Kur*, 1751.

DE BRITTO, *Archiv. d'opht.*, 1888.

BRONNER, *Trans. Ophth. Soc. United King.*, 1895–96.

BULL, C. S., *London Med. Record*, 1889, *N. Y. Med. and Surg. Jour.*, 1895; *Trans. Amer. Ophth. Soc.*, 1898.

BUSCH, *Chirurg. Beobachtungen*, 1854.

BUTLIN, *Med. Times and Gaz.*, 1875.

CHELIUS, *Handbuch d. Augenh.*, 1839.

COWLING, *N. O., Med. and Surg. Jour.*, 1855.

CRAMPTON, *Quart. Jour. Med. Science*, 1846.

DEBIÈRRE, *Rev. gén. d'opht.*, 1886.

DEMOURS, *Traité des maladies des yeux*, 1818.

DESAULT, *Œuvres chirurgicales*, iii.

DESMARRES, *Handbuch des ges. Augenheilk.*, 1852.

DIANOUX, "Des tumeurs de la glande lacrymale," *Ann. d'oculist.*, 1894.

DOBROWOLSKY, *Klin. Monatsbl. f. Augenheilk.*, 1881.

DOR, *Soc. franç. d'opht.*, 1888.

DU BOIS-REYMOND, *Rev. gén. d'opht.*, 1891.

EMMERT, *Dissertation*, Berne, 1870.

FANO, *Traité pract. d. mal. d. yeux*, 1862.

FIGOS, *Instit. d'anat. patol. del. R. Univ. di Sassari*, 1884.

v. FORSTER, *Graefe's Arch.*, 1878.

FOSTER, ARCH. OF OPHTH, 1891.

FROMAGET, "Tumeurs malignes primitives de la glande lacrymale orbitaire," *Jour. de méd. de Bordeaux*, 1897.

FROST, *Tr. Ophth. Soc. Unit. King.*, 1887.

FUCHS and ZIRM, *La semaine méd.*, 1891.

GALLASCH, *Jahrb. f. Kinderheilk.*, 1873.

GIULINI, *Münchener med. Wochensch.*, 1891.

GLUGE, *Jena Annalen f. Phy. u. Med.*, i.

GROSSMANN, *Allgem. Wiener med. Zeitsch.*, 1884.

GUÉRIN, RICHERAND, *Nosogr. chirurg.*, Paris, 1808.

GUTHRY, *Lectures on Operative Surgery*, p. 157.

HAAS, *Ein Fall von Sarkom der Thränendrüsen*, Giessen, 1897.

HALPIN, *Annal. d'oculist.*, 1848.

HALTENHOFF, *Annal. d'oculist.*, 1889.

HARLAN, *Trans. Amer. Ophth. Soc.*, 1882.

HILDANUS, *Observationes chirurgicæ*, 1598.

HIMLY, *Ophth. Bibl.*, iii.

HORNER, Pröhl's cit.

HUBER, *Inaug. Diss.*, Zürich, 1883.

JENNINGS, *Amer. Jour. Ophth.*, 1897.

JOHNSTON, *Maryland Med. Jour.*, 1880.

JÜNGKEN, *Lehre v. d. Augenkrankheiten*, 1842.

KELLY, *Phil. Month. Med. Jour.*, 1899.

KEYSER, *Amer. Med. Ass.*, 1884.

KING, *Glasgow Month. Med. Jour.*, 1853.

KNAPP, *Klin. Monatsbl.*, 1865; *Trans. Amer. Med. Ass.*, 1880; *Trans. of Amer. Ophth. Soc.*, 1882.

KÖHLER, *Charité Annal.*, Berlin, 1892.

KOESTER, *Archiv. f. path. Anat. u. Phys.*, Bd. xl.
LAWFORD, *Lond. Roy. Ophth. Hosp. Rep.*, 1890–93.
LAWRENCE, *Lancet*, 1840.
LEBERT, *Path. Anatom.*, 1851.
LENTENNEUR, *Gaz. des hôp.*, 1865.
LUDWIG, *Dissert.*, Rostock, 1883.
LYMAN, *Boston Med. and Surg. Jour.*, 1877.
MACKENZIE, *Traité des malad. de l'œil*, 1856; *Annal. d'oculist.*, xii.; *Ophth. Rev.*, 1865.
MASLIEURAT-LAGÉMARD, *Archiv. de méd.*, 1840.
MAZZA, *Verhand. des VII. Ophth. Cong.*, 1888.
MEDERO, *La Chronica Ophthalmologica*, 1877.
MIKULICZ, Snell's citation.
MOECKE, *Inaug. Diss.*, Kiel, 1891.
MOLLIÈRE and CHANDELLUX, *Lyon méd.*, 1880.
MOOREN, *Ophth. Mittheilung.*, Berlin, 1874.
NETTLESHIP, *Ophth. Hosp. Rep.*, viii., 1875.
O'BEIRNE, *Dublin Hosp. Rep.*, iii. Also cited by Salles.
v. OHLEN, *Beitr. v. Ziegler*, 1893.
PEMBERTON, *Quart. Jour. of Med. Sci.*, 1847.
PIAZZI, *Ann. di Ottal.*, Pavia, 1895.
PICK, *Cent. f. prakt. Augenheilk.*, 1896.
PIGEOLET, *Jour. méd. de Bruxelles*, 1847.
PORTAL, *Cours d'anat. méd.*, Paris, 1803.
POWER, *Trans. Ophth. Soc. Unit. King.*, 1882; *Lancet*, 1886; *Trans. Ophth. Soc. Unit. King.*, 1887.
PRÖHL, *Inaug. Diss.*, Berlin, 1892.
QUAGLIANO and GUAITA, *Contrib. alla storia clinica ed anat. dei tumori intra- ed extra-oculari*, 1878.
ROTHMUND, *Klin. Monatsbl. f. Augenh.*, 1865.
ROUX, *Mélange de chirurgie*, article "Cancer."
SALLES, *Diss.*, Montpellier, 1880.
SANDFORD, *Trans. Ophth. Soc. Unit. King.*, 1892–93.
SAUTEREAU, *Étude sur les tumeurs de la glande lacrymale*, Paris, 1870.
SAVARY, *Annal. d'oculist.*, Bruxel., 1874.
SCHIRMER, *Handbuch v. Graefe u. Sämisch*, vol. xii., 1876.
SCHMIDT, *Treatise on Diseases of the Lachrymal Apparatus*, 1803, Pröhl's cit.
DE SCHWEINITZ, *Trans. Amer. Ophth. Soc.*, 1898.
SCOTT, *Amer. Ophth.*, 1897.
SGROSSO, *Arch. di Ottal.*, Palermo, 1893.
SNELL, *Ophth. Rev.*, 1889; *Lancet*, 1893; *Brit. Med. Jour.*, 1889.
SOCOR, *Bull. soc. de méd. de Jassy*, 1889.
STENGEL, *Aerztl. Intelligenzblatt*, 1886.
TODD, *Dublin Hosp. Rep.*, iii.
TORTUAL, *Anatom. Berichte z. anat. Mus. zu Münster*, 1833.
TRAVERS, *Synop. of Dis. of the Eye*, 1820.
VELPEAU, *Dictionnaire de méd.*, article "Lacrymal."

VERLIAC, *Des neoplasms malins primitifs de la glande lacrymale orbitaire*, Bordeaux, 1896.
DE VINCENTIIS, *Estratto del mov. med. chir.*, 1876.
WARNER, *Cases of Surgery*, London, 1784.
WEINLECHNER, *Ber. d. k. k. Krankenanstalt in Wien*, 1878.
WERNER, *Brit. Med. Jour.*, 1898.
WHARTON-JONES, *Brit. Med. Jour.*, 1864.
WHITE, ARCH. OF OPHTHAL., 1882.
WARLOMONT, *Ann. d'oculist.*, Brux., 1862.

Tr. Am Ophth. Soc. June 1903
"Adenoma Co." See Meeting Francke
Schultze "Zur Kenntniss der epithelialen Tumordissemination"
Carcinoma à ep. perls.
Klin. Monats. Blätter für Augenheilk 1903, Beilageheft
Bess - Archiv f. Ophth. p. 573 (1904) adenoma
Zeitschrift f. Aug. p. 184 (1903) Lennander

ANISOMETROPIA.

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THERE is still such considerable difference of opinion with regard to the management of cases of anisometropia, that there seems little reason to apologize for offering one's personal experience in the matter. I am the rather led to offer mine, because it seems to differ more or less from that of some others who have written upon the subject, and particularly because it runs counter to the statements contained in many of our text-books. Accordingly, I present the following summary, which comprises all cases of anisometropia in which I have prescribed anything like the full correction, and in which, furthermore, the result could be determined. The excluded cases—those, namely, in which either no attempt was made to correct the anisometropia, or in which, although the correction was given, the result could not be followed up—are quite numerous, but are obviously without bearing upon the question in hand.

In the following table I have for the most part included only such cases as showed a difference of refraction of at least 2 D between the two eyes. The only exceptions are the cases (3, 9, 22, 24) in which, one eye being emmetropic, or nearly so, and having normal vision, the other was so ametropic as to show a marked reduction in sight.

The cases that I report are comparatively few. Yet the material, small as it is, has a certain value, in that it represents consecutive, and hence unselected cases—represents, in other words, all the cases within a given period, in which a thorough-going treatment of the anisometropia was applied, and in which, furthermore, the result of the treatment could be ascertained. It includes, therefore, all failures, as well as successes, so far as known, within the time limit.

No.	Name.	Age.	Sex.	Refractive condition.	Motor apparatus.	Glass ordered.	Result; remarks.
1	J. D.	70	F.	R — 6.50 cyl. 110° $\frac{1}{10}$ + L — 1.75 cyl. 80° $\frac{1}{10}$ +. Astigmatism lenticular, due to a non-progressive senile cataract. Four years ago refraction about as now. Ten years ago but slight astigmatism, and refraction of eyes nearly the same.	Insufficiency (primitive and post-operative) of superior and inferior recti, producing vertical diplopia. Muscular anomalies date back fourteen years or more.	R — 6.50 cyl. 110° L — 1.75 cyl. 80°.	Glass caused no distortion, and in itself was satisfactory; but diplopia, due to muscular trouble, caused great disturbance, and prevented the wearing of the glass.
2	W. P.	83	M.	R — 3.50 $\frac{1}{10}$ L + 1.00 cyl. 155° $\frac{1}{10}$ +. Fourteen years ago showed R — 4.00 L + 1.50.	Slight convergence insufficiency.	R plane L + 2.75 + 1.00 cyl. 155° for reading.	Glass caused no trouble, but he does not use it.
3	H.	60	F.	R — 1.00–2.00 cyl. 75° $\frac{1}{10}$ — L — 0.25–0.25 cyl. 100° $\frac{1}{10}$ —. Incipient cataract. Refraction five years before essentially the same, but she showed a little more myopia. Three years later refraction R same, L — 0.75 cyl. 105°.		R + 0.25 + 2.00 cyl. 165° L + 2.75 + 0.25 cyl. 10° (reading).	Glass very satisfactory.
4	W. I. F. A.	25	M.	R — 7.00 $\frac{1}{10}$ L — 4.00–0.50 cyl. 45° $\frac{1}{10}$ Using { R — 4.50–0.50 cyl. L — 3.50–0.50 cyl.	Divergence excess; causes occasional (superable) diplopia.	R — 7.00 L — 4.00 – 0.50 cyl. 45°.	Glass made him feel much better, and relieved headaches.

5	W. R.	19	M.	(Homatropine.) R — 2.00 + 5.50 cyl. 95° L + 0.50 + 1.00 cyl. 90°. Later with R — 2.25 + 5.00 cyl. 95° $\frac{10}{10}$ L + 1.00 cyl. 90° $\frac{10}{10}$. Had been using R — 0.75 + 2.25 cyl. 90° L + 0.50 cyl. 90°. One year later showed increase of myopia.	Slight insufficiency of elevators and depressors.	R — 2.25 + 5.00 cyl. 95° L + 1.00 cyl. 90°.	Had no trouble in using glass.
6	F. R.	23	F.	(Homatropine.) R—0.50+1.75 cyl. 100° $\frac{12}{12}$ —. L + 5.00 cyl. 75° $\frac{10}{10}$. Had been using R — 0.50 + 0.75 cyl. 90°. L plane. These had not relieved her very marked asthenopia. Six years later showed R — 1.00 + 2.25 cyl. 90° L + 4.00 or + 5.00 cyl. 65°	Slight convergence insufficiency, and divergence excess.	R. — 0.50 + 1.50 cyl. 100° L + 4.00 cyl. 75°.	Glass caused great improvement.
7	F. W. W.	30	M.	R — 1.00 cyl. 180° $\frac{10}{10}$ + L + 1.00 + 2.75 cyl. 80° $\frac{10}{10}$.	Slight insufficiency of convergence and divergence.	R — 1.00 cyl. 180° L + 1.00 + 2.75 cyl. 80°.	Reports two or three days later that he sees well with glasses, but they "draw" his eyes.

No.	Name.	Age.	Sex.	Refractive condition.	Motor apparatus.	Glass ordered.	Result; remarks.
8	L. K.	48	M.	R + 3.00 + 3.50 cyl. 95° $\frac{20}{15}$– L + 0.50 + 1.25 cyl. 90° $\frac{20}{20}$ +. Had previously worn glasses more or less correcting the anisometropia. Three years later showed R + 3.00 + 4.00 cyl. 95° L + 0.50 + 2.00 cyl. 90°.	Muscles normal.	R + 3.00 + 3.50 cyl. 95° L + 0.50 + 1.25 cyl. 90°. (Distance.) R + 5.00 + 3.50 cyl. 95° L + 2.00 + 1.25 cyl. 90°. (Reading.) Three years later ordered R + 3.00 + 4.00 cyl. 95° L + 0.50 + 2.00 cyl. 90°, and for near + 1.00 added.	Glasses very satisfactory (the first really satisfactory ones he has had); binocular vision much better than vision with left eye alone.
9	W. H. C.	25	M.	(Homatropine.) R − 0.75 cyl. 15° $\frac{20}{20}$ + L − 1.75 $\frac{20}{20}$ +	Left hyperphoria 1°; convergence insufficiency.	R − 0.75 cyl. 15° L − 1.75 sph.	After a short time finds glass essential for all purposes. Reads well with it, and V = $\frac{20}{20}$.
10	E. M.	5	F.	(Homatropine.) R − 3.00 L + 1.25.	R. strab. conv. intermittent.	R − 3.00. L + 1.25.	Strabismus diminished. Seems to see well with glass for distance, but says that it blurs sight for near.

11	E. O. A.	20	M.	R — 6.00–0.75 cyl. 180° $\frac{20}{15}$ L — 8.00–0.75 cyl. 180° $\frac{20}{15}$. Had been using — 5.00 each. R later became — 6.50–1.25 cyl. 180°.	Artificial right hyperphoria due to displaced glass.	R — 6.00–0.75 cyl. 180° L — 8.00–0.75 cyl. 180°.	For first two or three days glass caused trouble, and he could not read with it. Afterwards satisfactory.
12	A. Q.	31	M.	(Homatropine.) R — 3.00 + 6.50 cyl. 90° $\frac{20}{15}$ L + 1.25 cyl. 100° $\frac{20}{40}$ +.	Divergence insufficiency marked, with consecutive convergence excess, causing alternating strab. conv. with marked homonymous diplopia for distance. Slight left hyperphoria.	R — 3.00 + 6.00[1] cyl. 90° L + 1.25 cyl. 100°. [1] Optician made up R — 3.00 + 5.00 cyl. 90°.	Glass did well for near. For distance, feels better without glass (evidently because of the diplopia). Tenotomy of R int. and advancement R ext. produced only partial correction of the deviation.
13	G. L. L.	18	M.	(Homatropine.) R + 2.00 $\frac{15}{15}$ + L + 5.00 + 1.00 cyl. 145°, $\frac{15}{10}$. Three years later showed R + 1.25 + 0.50 cyl. 90°, $\frac{15}{15}$ + L+4.50+1.00 cyl. 130°, $\frac{15}{15}$.	Muscles normal.	R + 1.25 L + 4.00 + 1.00 cyl. 145°.	Glass of great service and from the first produced no trouble.
14	C. M. A.	25	M.	(Homatropine.) R + 1.50–3.50 cyl. 175° L + 1.00 + 1.00 cyl. 100°.	Muscles normal.	R + 1.00–3.50 cyl. 175°. L + 0.50 + 1.00 cyl. 100°.	Glass satisfactory. Used continuously for five years.

No.	Name.	Age.	Sex.	Refractive condition.	Motor apparatus.	Glass ordered.	Result; remarks.
15	J. M. B.	28	F.	(Homatropine.) R — 1.50–0.25 cyl. 90° $\frac{15}{15}$ — L + 0.75–6.00 cyl. 90° $\frac{15}{15}$ —. Using R — 1.00, L — 1.00–2.50 cyl. 95°, but these unsatisfactory.	Muscles normal.	R — 1.50–0.25 cyl. 90° L + 0.75–5.50 cyl. 90°.	Glass accepted at once and very satisfactory. Binocular single vision with glass. Two and a half years later, conditions same, and glass continues satisfactory.
16	E. F.	23	F.	(Homatropine.) In 1896 showed R — 0.75 + 4.00 cyl. 180° $\frac{15}{15}$ + L + 0.75 + 1.00 cyl. 5° $\frac{15}{15}$ +. In 1898 R — 1.00 + 5.50 cyl. 180° $\frac{15}{15}$ + L + 1.50 cyl. 5°, $\frac{15}{15}$ —. In 1900 R — 1.00 + 7.00 cyl. 180° $\frac{15}{15}$ — L + 4.00 cyl. 5° $\frac{15}{15}$ ±. Marked corneal astigmatism *with* rule. Apparent lenticonus anterior.	Muscles normal.	In 1896 R — 1.00 + 4.00 cyl. 180° L + 0.50 + 1.00 cyl. 5°. In 1898 R — 1.00 + 5.50 cyl. 180°. L + 1.50 cyl. 5°. In 1900 R — 1.00 + 7.00 cyl. 180° L + 4.00 cyl. 5°.	In every instance accepted glass, and used it with satisfaction for all purposes. Binocular vision with glass better than vision of either eye separately.
17	D. M.	46	F.	(Homatropine.) R — 1.50 + 5.50 cyl. 100° $\frac{15}{15}$ —. L + 0.50 + 0.50 cyl. 180° $\frac{15}{15}$ —. Headaches and asthenopia dolens unrelieved by use of sphericals for near work.	Convergence insufficiency, marked. Sometimes binocular fixation for near, sometimes R. diverges widely. Binocular fixation better with glass, as found.	R — 1.50 + 5.50 cyl. 100° L + 0.50 + 0.50 cyl. 180°.	Result uncertain, but probably did not get on well with glass.

18	J. J. D.	35	M.	(Homatropine.) R — 0.75 + 2.00 cyl. 80° $\frac{1}{10}$ L — 350–0.50 cyl. 170° $\frac{1}{10}$ +.	Convergence insufficiency. Sometimes binocular fixation at near, sometimes R diverges.	R — 0.75 + 2.00 cyl. 80° L — 3.50–0.50 cyl. 170°.	Used glass for distance and near without trouble and with great satisfaction.
19	A. D. B. C.	49	M.	(Homatropine.) R — 3.50 cyl. 90°, $\frac{1}{10}$ L — 4.50–0.75 cyl. 85°, $\frac{1}{10}$ —.	Convergence insufficiency (moderate).	R — 3.00 cyl. 90° L — 4.50–0.75 cyl. 85°, and for near same with + 1.50 added.	Apart from slight trouble with reading glass at first, used glasses with great satisfaction.
20	F. A.	42	M.	R + 1.00 cyl. 80° $\frac{1}{10}$ — L + 3.50 $\frac{1}{100}$ +. (Skiascopy shows more Hy. both.)	L strab. div., constant (post-operative insuff. interni after operation for strab. conv.).	R + 0.75 + 1.00 cyl. 80°. L + 3.50 (reading).	Glass satisfactory.
21	E. D.	16	F.	(Homatropine.) R + 0.25 + 0.50 cyl. 100° $\frac{1}{10}$ — L — 2.00–0.25 cyl. 100° $\frac{1}{10}$ —. Asthenopia and conjunctival irritation. Had been using without success R plane, L — 1.75 for distance, and no glass for near.	Muscles normal.	R + 0.50 cyl. 100° L — 2.00 — 0.25 cyl. 100° (constant).	Glasses used for distance and near; satisfactory, and she was much better with them.
22	W. J. H.	45	F.	(Homatropine.) R + 0.25 cyl. 85° $\frac{1}{10}$ + L + 0.50–2.25 cyl. 180° $\frac{1}{10}$ — Without glass, L = $\frac{1}{10}$ —.	Muscles normal.	R — 0.25 cyl. 175° L + 0.25–2.25 cyl. 180°. For distance and same with + 1.00 added for near.	Glasses very satisfactory.

No.	Name.	Age.	Sex.	Refractive condition.	Motor apparatus.	Glass ordered.	Result; remarks.
23	J. J. D.	32	F.	Using R + 2.00 L + 2.25 + 1.75 cyl. 120°. With these can read with L eye. Without glass reads with R eye. First test showed (Homatropine) R + 2.50 + 0.75 cyl. 90° $\frac{1}{12}$ − L + 4.50 + 1.25 cyl. 110° $\frac{1}{10}$. Headaches, frontal and occipital.	Muscles normal when refraction is corrected.	R + 2.00 + 0.75 cyl. 90° L + 3.75 + 1.25 cyl. 110°.	After a week's trial still had headache and vision not satisfactory. Re-examination showed R + 2.75 + 0.75 cyl. 90° L + 4.25 + 1.75 cyl. 115°. Then replaced L glass by + 3.00 + 1.75 cyl. 115°. Patient left city, and no further report received.
24	E. W. P.	49	M.	(Homatropine.) R − 2.00 cyl. 100°, $\frac{1}{8}$ − L + 0.75 cyl. 20°, $\frac{1}{12}$ −. Had previously worn a variety of glasses.	Muscles practically normal.	R − 2.00 cyl. 100° L + 0.75 cyl. 20°. And for near same with + 1.50 added.	Glasses serve very well. He finds satisfaction from bringing right eye into use.
25	E. K. S.	51	F.	R − 0.25 cyl. 90° $\frac{1}{12}$ + L − 2.50–0.50 cyl. 90° $\frac{1}{10}$. Has been using reading-glass which did not correct the anisometropia.	Divergence excess with (consecutive) convergence insufficiency. For distance and near usually binocular fixation, but sometimes L diverges. Exophoria and crossed diplopia of about 20°, distance and near. R hyperphoria 2°.	R − 0.25 cyl. 90° L − 250–0.50 cyl. 90° distance. R + 2.25 + 0.25 cyl. 180° L − 0.50 cyl. 90° reading.	Reads well with near glass. With glasses maintains binocular fixation and binocular single vision better than without.

26	R. F.	11	F.	(Homatropine.) R — 7.00–2.00 cyl. 110° $\frac{1}{10}$ L + 0.50 cyl. 30° $\frac{1}{10}$ —.	Strab. div. R (constant) 12°–14°, distance and near. Crossed diplopia with red glass.	R — 7.00–2.00 cyl. 110° L + 0.50 cyl. 30.° To practise R eye and exercise convergence.	Vision in R eye improved to $\frac{1}{10}$ + after using glass three months. Still strab. div. but deviation less. In eight months, binocular fixation for distance; very little deviation for near. No trouble in using glass.
27	K. C.	21	F.	(Homatropine.) R — 6.00–5.00 cyl. 40°, $\frac{1}{10}$ — L — 8.00–5.00 cyl. 130° $\frac{1}{10}$ —. Macula corneæ L. Infero-temporal conus.	R hyperphoria 2°; otherwise muscles normal.	R — 6.00–5.00 cyl. 40° L — 8.00–5.00 cyl. 130°.	After first week glasses satisfactory and she uses them for her work (sewing) and for all purposes. R with glass $\frac{1}{10}$, L $\frac{1}{10}$ —.
28	E. L. M.	37	F.	(Homatropine.) R — 0.50–0.25 cyl. 180, $\frac{1}{10}$ + L — 3.50 + 7.00 cyl. 90° $\frac{1}{10}$ +.	Esophoria (slight), distance. L hyperphoria about 1°. Binocular fixation.	R — 0.50–0.25 cyl. 180° L — 3.50 + 7.00 cyl. 90°.	Glass caused no distortion and no trouble except that during the first week or two of wearing it seemed to "draw" eyes, after prolonged use. Later on, eyes seemed to work better. — With L glass reads No. 2 Jäger.

No.	Name.	Age.	Sex.	Refractive condition.	Motor apparatus.	Glass ordered.	Result; remarks.
29	S. S.	75	F.	R − 1.25 $\frac{15}{20}$ − L + 1.25 $\frac{15}{20}$ −.	Muscles normal.	R + 2.25. L + 4.50. near.	Reads No. 1 Jäger fluently with glass.
30	S. S. H.	33	M.	(Homatropine.) R − 16.00 $\frac{15}{20}$ − L 12.00–3.00^c 180° $\frac{15}{20}$ + −. Had been using R − 12 L − 10–1.50^c 180°. With these, unpleasant haze before the eyes, which is relieved when a − 4.00 D is *added to R glass.*	Divergence insufficiency. Esophoria and homonymous diplopia 5–6°, distance; for near, slight exophoria and binocular fixation.	R − 16.00 L − 12.00–3.00^c 180°.	Glass abrogated haze, and he saw well and comfortably with it for distance and near.
31	H. L. C.	22	F.	(Homatropine.) R − 13.00–1.00 cyl. 180°, $\frac{20}{20}$ −. L − 9.00–2.00 cyl. 180° $\frac{20}{20}$ −. Had been using − 8.00 each.	Without glass divergent strabismus R for distance and near; with her (−8.00 D) glass, strab. div. R for distance, binocular fixation for near.	R − 13.00–1.00 cyl. 180° L − 9.00–2.00 cyl. 180°.	At first glasses caused vertigo and R glass seemed too strong. Afterward not only saw much better with them than with old glasses, but eyes felt more natural with them, and they were satisfactory. With glasses binocular fixation for near; for distance, marked exophoria and with red glass crossed diplopia; without red glass binocular fixation, *i. e.*, gradual reduction of strabismus and restoration of binocular fixation. With glass, V = $\frac{20}{20}$ ±.

32	C. E.	37	F	(Homatropine.) R — 3.00–275 cyl. 30°, $\frac{20}{100}$ + L + 1.00 + 0.75 cyl. 80° $\frac{20}{20}$. R eye always poor; has been failing perceptibly for past two years. R inferior conus and displacement of pigment.	Orthophoria (test by screen).	R — 3.50–2.75 cyl. 30° L + 0.50 + 0.75 cyl. 80°, and to practice R eye.	Two or three weeks later reported that glass troubled her head. R vision increased to $\frac{20}{70}$ +. Later, reported that glass made her ill and she was obliged to lay it aside.
33	D. K.	10	F.	(Atropine.) R + 4.25 + 1.25 cyl. 90° $\frac{15}{20}$ L + 1.75 + 0.75 cyl. 90° $\frac{15}{15}$. With both eyes, V = $\frac{15}{15}$ —.	Orthophoria.	R + 3.50 + 1.25 cyl. 90°. L + 1.00 + 0.75 cyl. 90°.	Derived great satisfaction from her glasses, which not only enabled her to do her work in school well, but entirely relieved her of the headaches from which she had suffered.
34	H. F.	30	M.	(Homatropine.) R — 20.00 D $\frac{20}{70}$ + L — 12.00–2.00 cyl. 180°, $\frac{20}{15}$. Gyrate and guttate areas of choroidal atrophy between disc and macula, both eyes.		R — 18.00 L — 12.00–2.00 cyl. 180°.	Glasses too strong for near; no other trouble with them. Then prescribed R — 15.00 L — 9.00–2.00 cyl. 180°.

No.	Name.	Age.	Sex.	Refractive condition.	Motor apparatus.	Glass ordered.	Result; remarks.
35	K. K.	36	F.	(Homatropine.) R + 1.25 + 0.50 cyl. 90°, $\frac{10}{10}$ L − 4.50 cyl. 180°, $\frac{20}{70}$. Punctate opacities in lens (partial stationary cataract).	With and without glass, strab. div. L for distance; binocular fixation for near, and convergence near-point about normal (divergence excess). L hyperphoria 2°.	R + 0.50 + 0.50 cyl. 90° L − 0.50 − 4.25 cyl. 180°.	At first refused to wear glass, saying that it blurred sight for distance, although she saw well with it for near. Later, wore glass continuously for a week and then without trouble; with it binocular fixation most of the time both for distance and near.
36	K. C.	17	F.	(Homatropine.) R − 5.00–5.00 cyl. 155°, $\frac{10}{10}$ L − 4.00 cyl. 25°, $\frac{10}{10}$ +. Headaches.	L hyperphoria, 2° to 5°. Divergence excess; exophoria marked for distance with crossed diplopia alternating with binocular fixation; for near, moderate exophoria with binocular fixation.	R − 5.00–5.00 cyl. 155° L − 4.00 cyl. 25°.	Glass very comfortable both for distance and near (reads easily with it.) Has relieved headaches. With glass, both vertical and lateral deviation less, and there is usually binocular fixation.

37	B. M.	17	F.	(Homatropine.) R + 0.50 $\frac{20}{15}$ L + 2.50–4.50 cyl. 10°, $\frac{20}{70}$. L eye has begun to turn out only recently.	Strabismus div. L for distance; for near, moderate exophoria with binocular fixation and normal convergence near-point (divergence excess).	R plane L + 1.75–4.50 cyl. 10°.	Used glass steadily for distance and near without trouble. With and without glass, strab. div. L for distance; for near, sometimes binocular fixation, sometimes alternating strabismus divergens.
38	A. S.	19	F.	(Homatropine.) R − 5.50–3.00 cyl. 180°, $\frac{20}{20}$– L − 9.00–3.00 cyl. 180° $\frac{20}{15}$ −.	Binocular fixation and no deviation for distance or near either with glass or without.	R − 5.50–3.00 cyl. 180° L − 9.00–3.00 cyl. 180°.	After wearing glass one week says she sees well with it. Has considerable headache.
39	S. W.	8	F.	(Homatropine.) R − 12.00 $\frac{20}{15}$ + L − 0.50–1.25 cyl. 180° $\frac{20}{40}$.	Very slight exophoria with binocular fixation both distance and near with and without glass. Convergence near-point normal.	R − 12.00 L − 0.50–1.25 cyl. 180°.	Glass accepted at once and worn without trouble. Sees well with it. Perfect binocular fixation.

SUMMARY OF RESULTS.

Summarizing the *results* set forth in the foregoing tables, we find:

In twenty-eight cases, namely, Nos. 3, 4, 5, 6, 8, 9, 11, 13, 14, 15, 16, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 33, 36, 37, 39, the glasses, either immediately or after a few days' trial, were satisfactory — in most cases very highly so.

In Case 35, the immediate result was unsatisfactory, and the patient did not try to use the glass steadily. Later she did use it steadily, and after doing so for a week found that the glass no longer gave her trouble and that she saw well with it. Moreover, the marked deviation that existed in her case had been noticeably diminished.

In Case 38, the patient saw well with the glass and wore it readily, but had headaches with it. Had, however, used it for only a week.

In Case 7, the immediate result was not perfectly satisfactory, but, as the history of the successful cases shows, not sufficient time had elapsed for a definite decision.

In Case 23, the correction was also unsatisfactory at first, but here evidently the proper glass had not been prescribed, and the ultimate result after the change had been made could not be ascertained.

In Case 2, the glass seemed to give no trouble but was not worn.

In Cases 1 and 12, the glasses per se were satisfactory, but, owing to the presence of a considerable muscular deviation, caused trouble as soon as this deviation became pronounced enough to produce diplopia. Thus, in Case 1, the glass became confusing at the moment when, owing to the paretic state of the superior and inferior recti, a vertical diplopia developed. When this diplopia was absent, the glass caused no confusion and no distortion. So, in Case 12, the glass was satisfactory for near work, the patient having binocular single vision for near; but for distance, where owing to his divergence insufficiency he had an insuperable homonymous diplopia, the glass caused disturbance. This can be readily understood when we consider that the glass, by enhancing the distinctness of both the images, prevents the patient from

ignoring one of them in case diplopia is present, and thus by rendering the diplopia more obtrusive indirectly adds to the confusion produced by it.

Case 10 probably was an instance somewhat similar to those just cited, although from the patient's age it was impossible to get at any certain information. She had good vision with the glass for distance, but for near there was blurring probably due to the homonymous diplopia, which became more evident to her and hence more obtrusive as the strabismus diminished and the double images consequently came closer together.

Case 35, already cited, is probably of like character. This patient, who had a well-marked divergence, could from the outset see well with her glass for near, where the deviation was slight and readily overcome, but had considerable confusion and blurring of sight for distance, where the deviation was pronounced.

In Case 34 the difficulty seemed to be not that the two concave glasses used differed in strength, but that each glass by itself was too strong. For the patient had no disturbance nor distortion with the glasses, but simply found that they made near objects too small, and that he saw well when he in effect made them less strong by shoving them off from his eyes.

In Case 32 and probably also in Case 17 the correction was not satisfactory and the glass was not borne.

To recapitulate:

Correction satisfactory	28
Correction at first unsatisfactory, but becoming more and more satisfactory all the time (Case 35)	1
Glass satisfactory for seeing but caused headache (temporary result)	1
Glass gave no trouble, but not worn (Case 2)	1
Glasses satisfactory per se, but patient could not wear them on account of diplopia due to muscular trouble (Cases 1 and 12)	2
Temporarily unsatisfactory (Cases 7 and 23)	2
Uncertain (Cases 10 and 34)	2
Unsatisfactory (Cases 17 and 32)	2

The two cases classed as "uncertain" were almost certainly instances of the successful application of the glasses, and even in those classed as "temporarily unsatisfactory" the ultimate outcome in one was really uncertain, and in the other (Case 23) there was decided improvement of vision. Leaving out, however, the two uncertain cases and the case in which the glass gave no trouble but was not worn, and classing the other cases not certainly successful as failures, we find that out of 36 cases the correction was completely satisfactory in 28 (= 78 per cent.), satisfactory for vision, but still causing a little discomfort at the end of a week's time, in 2 (= 6 per cent.), while in 6 (= 16 per cent.) it produced from one cause or another temporary or permanent discomfort.

To the cases just cited one or two others might have been added in which the immediate result (at the time of testing) was so favorable as to apparently warrant subsequent success. But these cases have not been included.

As is well known, it is *not always the cases of high anisometropia that give rise to trouble* when corrected. Even slight degrees may occasion disturbance. Thus, to cite one instance, persistent trouble was produced by an attempt to wear a glass of R + 2.00 + 0.50 cyl. 90°, L + 3.50. This glass was 0.50 D less than the full correction as found under homatropine. To produce comfortable vision, the cylinder had to be discarded altogether, and the difference between the right and left sphericals reduced to 0.50 D.

On the other hand, cases of *quite high anisometropia have accepted the correction* without trouble. See Cases 8, 13, 26, 28, 31, 36, 39.

Furthermore, it must be emphasized that the gain in using the glass was not simply the negative one that the glass could be worn without disturbance. In many instances, the non-use of the glass—*the failure to correct the anisometropia —was distinctly the cause of trouble* which was not remedied until an efficient correction was applied. See Cases 4, 6, 8, 13, 15, 16, 21, 24, 30, 31, 33, 36.

Naturally, we find that when the anisometropia *has already been partially corrected* we can count the more con-

fidently upon securing an immediate favorable result when applying the full correction. See Cases 5, 8, 15, 30.

Finally, in cases associated with *marked muscular deviation*, the correction of the anisometropia may tend to diminish or abrogate the latter. See Cases 10, 25, 26, 31, 35, 36.

SHALL WE REGULARLY CORRECT ANISOMETROPIA?

That high degrees of anisometropia can *at times be corrected* is well known. Mauthner, for instance, who has treated this subject of anisometropia, as he has almost every other phase of refraction work, in his *Vorlesungen über die Optischen Fehler des Auges*, mentions (p. 704) the case of a myope, who had been wearing — 3.50. While wearing these glasses, he began to develop a divergent strabismus. He then received R — 3.00, L — 8.00, which were not only well borne, but also caused the strabismus to disappear.

Risley[1] cites a case in which an excellent result was secured with the combination

R + 0.50 cyl. 90°, L + 2.75 cyl. 115° — 2.75 cyl. 25°.

Reagan[2] records a case of cataract extraction in which R + 10.00 D and L — 10.00 were worn simultaneously with comfort. It is not, however, stated whether the patient had binocular vision or not. But in the similar case of Thomson's,[3] in which a difference of 10 D, or more, between the two eyes was satisfactorily corrected, binocular vision was present.

Many similar scattered instances could, no doubt, be collected from the literature. But the question that interests us to solve is not "Can we sometimes correct anisometropia?" but "Shall we systematically and as a regular thing endeavor to correct it?" And my experience leads me to believe that in all cases in which the vision of the more ametropic eye can be brought up to anything like the normal, *the attempt, at least, should be made to correct the anisometropia, and that this attempt should be persevered in* until either its success or its failure has been fully demonstrated. This

[1] *Ophthal. Record*, 1899, p. 393.
[2] *Ibid.*, 1899, p. 515.
[3] *Archives of Ophthal.*, 1899, p. 627.

means a trial of the glasses for several weeks at least and, until such a trial has been made, it cannot be justly asserted that the glasses are a failure. For it often happens with these, as with other strong glasses, that they produce discomfort at first and yet later are worn with the utmost satisfaction, and often, too, relieve important symptoms. This was prominently seen in several of my cases.

The indication for using the glasses is especially urgent when there is *a beginning strabismic deviation* which diminishes, or seems likely to diminish, with the full correction of the refraction. Yet these very cases may at first give the most trouble when corrected, since they are apt to have diplopia, and the diplopia becomes more evident, and hence more troublesome, when the vision is improved by glasses. (Compare Case 35.)

On the other hand, *in cases of pronounced strabismus* with complete loss of binocular fixation and partial loss of binocular vision, the use of glasses correcting the anisometropia will, in general, cause no trouble, as now the two eyes will obviously not interfere with each other, and each will do well with its own glass. The glasses in this case may be useful not only in helping to diminish the squint, but also in conserving the sight of the squinting eye, particularly if the strabismus is alternating.

CAUSES OF FAILURE IN CORRECTING ANISOMETROPIA.

What are the chief causes of failure in applying correcting glasses in anisometropia?

1. The cause usually assigned is that with the glasses *the image formed on one retina is larger than that formed on the other*, and hence it is impossible for the patient to fuse the two images satisfactorily. But, as Mauthner truly says, if the mere difference in the size and appearance of the two images is what gives trouble, we should find in this an argument for, rather than against, the correction of anisometropia, since in uncorrected anisometropia the images are always of a very different size.

As a matter of fact, unless the anisometropia is of a very high degree indeed, we shall, by correcting it, render of the

same size the retinal images that before were widely unequal. This is a fact that can be demonstrated both theoretically and practically. I have proved it experimentally in several cases where the correction was applied. A weak prism was placed before one eye, so as to separate the two images a short distance from each other, and thus enable them to be readily compared. In the cases that I examined the statement made was that the images with the anisometropic correction were alike in size and shape, although, of course, one was much more distinct than the other.

So far from believing that a disparity between the retinal images is the cause of the difficulty in wearing glasses for anisometropia, I think it constitutes one of the main difficulties that exists when they are not worn, and furnishes one of the main reasons for prescribing them in anisometropia. In uncorrected anisometropia the patient not infrequently complains of a blur or of some other uncomfortable sensation, which is evidently produced by the superposition of images, one of which is indistinct and of a different size from the other. The relief of the blurring and discomfort afforded by the correcting glass is often decided.

2. In some cases, the patient finds it difficult to wear the glasses, not because they are different from each other, but *simply because they are strong*, and particularly because they contain strong cylinders. This difficulty is usually entirely remedied by faithful and persistent use of the glass, kept up for a week or two.

3. In other cases, the *prismatic effect of the glass* is a cause of disturbance. That is, if the patient looks anywhere but through the centre of his glass, he virtually looks through a prism, which, as the glasses are unequal in strength, is stronger for one eye than for the other. He thus either gets diplopia with confused vision, or else overcomes the prism, and thus sees clearly, but at the expense of considerable muscular effort. Jackson, who has directed special attention to this cause of trouble in wearing the glasses, emphasizes the importance of minimizing it by placing the glasses as close as possible to the eyes.

I have no doubt that this does constitute a difficulty in using glasses in these cases, yet it seems to be a difficulty that is rather easily overcome. At least, in my cases it has not seemed to give rise to any permanent disablement.

4. In several of my cases the presence of *a muscular deviation was the cause of the patient's inability* to use the glasses. That is, there was good and comfortable vision with the glasses as long as the muscular deviation was so moderate as not to give rise to diplopia. As soon, however, as the muscular conditions were such that diplopia supervened, the glasses made matters worse by enhancing the distinctness of the double images, and thus rendering the diplopia more obtrusive and more difficult to ignore.

From one or another of these causes trouble may be, and indeed in most cases actually is produced, at first by the correction of anisometropia. But in my experience, if the glasses are worn persistently, the troubles they occasion soon abate. Then they are worn with ease and pleasure, and often, moreover, relieve blurring of sight, asthenopia, and other disagreeable symptoms that ordinary glasses had failed to correct.

TENDENCY TO HIGHER REFRACTION IN THE RIGHT EYE IN CASES OF ANISOMETROPIA.

Schulin[1] says: "Cases of anisometropia, which are not complicated with a great amount of astigmatism, have the right eye less hyperopic or more myopic than the left." He finds out of 90 cases of hyperopia 86 in which the right eye is less hyperopic than the left, and out of 18 cases of myopia 17 in which the right eye is more myopic than the left.

I fail to find such a large preponderance of cases in which the right eye is the more refractive. Taking the cases in which the refraction of the two eyes differed by 0.50 D or more and omitting all cases in which the anisometropia was due to opacities or other disease of the cornea or lens, I find

[1] *Annals of Ophth.*, 1900, p. 254.

	R eye more refractive.	L eye more refractive.	Total.
Cases with no astigmatism or with astigmatism not over 1 D	52	43	95
Cases with astigmatism over 1 D	62	37	99
Total	114	80	194

And taking only the cases of high anisometropia, I find

	R eye more refractive.	L eye more refractive.	Total.
Cases with no astigmatism or with astigmatism not over 1 D	17	9	26
Cases with astigmatism over 1 D	18	11	29
Total	35	20	55

We may ask whether, when the two eyes are of unequal refraction, it is the right or the left that in general is further from the normal. So far as my statistics go, the two eyes are quite alike in this regard. Thus, out of 138 cases of non-pathological anisometropia the right eye was more ametropic in 70, the left eye in 68, and of 60 cases in which the anisometropia was high, the right eye was more ametropic in 31, the left eye in 29.

RELATION OF ANISOMETROPIA TO MUSCULAR DISORDERS.

An analysis of 115 cases (60 of low, and 55 of high anisometropia) is shown in the table on the following page.

Of the 20 convergent deviations 12 were cases of actual *convergent squint*, of which 5 occurred in connection with low anisometropia and 7 with high anisometropia. The 45 divergent deviations included 15 cases of *divergent squint*, 7 with low, and 8 with high anisometropia. One of the cases of divergent squint showed also a (paretic) strabismus deorsumvergens.

	Low anisometropia.	High anisometropia.	Total.
Cases in which a muscular deviation was present, but had either antedated the anisometropia or was obviously unrelated to it	2	3	5
Orthophoria (lateral)	21	18	38
Muscular condition not stated except that there was no hyperphoria	1		1
Convergence excess	4	5	9
Divergence insufficiency	4	2	6
Convergent deviation (character not indicated)	3	2	5
Convergence insufficiency	10	12	22
Divergence excess	8	10	18
Insufficiency of interni	1		1
Divergent deviation (character not stated)	3	1	4
Hyperphoria (of 1° or more)	7	12	19
Deduct for cases included twice (under both lateral deviations and hyperphoria)	4	10	14
Total	60	55	115

The cases may also be grouped as follows:

	Low anisometropia.	High anisometropia.	Total.
Without lateral deviation	24	20	44
Convergent deviations	11	9	20
Divergent deviations	22	23	45
Total	57	52	109

Some have supposed that there is a necessary *connection between anisometropia and hyperphoria.* In many of our cases, owing to the conditions under which the examinations were made or to other circumstances, it cannot be stated with certainty whether a low degree of hyperphoria was present or not. In the remaining cases the results were as follows:

	Low anisometropia.	High anisometropia.	Total.
Cases in which hyperphoria of 1° or more could be excluded with certainty	40	25	65
Hyperphoria with convergence	1	3	4
Hyperphoria with divergence	3	7	10
Hyperphoria without lateral deviation	3	2	5
Total	47	37	84

In other words, about 15 per cent. of the cases of low anisometropia, and over 32 per cent. of the cases of high anisometropia had a hyperphoria of 1° or over. The latter percentage is distinctly high, the former not above the average when compared with the general run of cases, in which a careful search for hyperphoria has been instituted.[1]

CONCLUSIONS DRAWN.

The conclusions that may be drawn from the cases presented—so far as it is allowable to make deductions at all from a number so limited—are as follows:

1. In the large majority of cases of anisometropia, even those in which the difference in refraction exceeds 2 D, *the full correction can be applied with success*, provided the patient is warned that it may take him one or two weeks to get accustomed to the glasses, and that during this period he must use them steadily.

2. In many instances *temporary discomfort* is produced by the glasses, but in the majority of such cases the discomfort soon disappears, if the glasses are steadily worn. The period of time that it takes a patient to get used to the glasses so that they no longer give discomfort, varies from a few hours to one or, it may be, two weeks.

3. After the patient has become accustomed to the glasses, they are not only worn with ease and satisfaction, but also *often relieve important symptoms*, which glasses not compensating the anisometropia do not relieve.

4. It is especially important *to apply the correction when there is a beginning squint*, which is evidently due to the anisometropia. Yet it is in these very cases that we may expect difficulty in the acceptance of the glasses.

5. The *causes of temporary or permanent discomfort* in using glasses are:

(a) either the strength of the glass per se.

(b) The unequal prismatic action of the unequally strong glasses. This gives rise either to diplopia and confused sight, or to muscular asthenopia due to efforts made in overcoming the prism.

[1] Compare statistics of Reber, *Journ. Am. Med. Assoc.*, Jan. 19, 1901. With these statistics my own records show a substantial agreement.

(c) The presence of a muscular deviation producing diplopia. The glasses in this case, by enhancing the distinctness of the double images, forces them more upon the patient's attention, so that they are more difficult to ignore, and hence give more trouble than when seen without the glass. This I believe to be one of the most frequent causes of a permanent difficulty in using the glasses.

6. The statement that glasses correcting anisometropia cause trouble by *producing retinal images that are of a different size* in the right eye and in the left is probably fallacious, trouble not being caused in this way.

7. In anisometropia there is a moderate *tendency for the right eye to be the more refractive of the two.* In my cases, the right eye was the more refractive in fifty-eight per cent. and, counting only the cases of high anisometropia, it was the more refractive in sixty-four per cent.

8. In anisometropia the proportion of cases in which the right eye is *the more ametropic* about equals those in which the left eye is the more ametropic.

9. Anisometropia is very *frequently conjoined with muscular anomalies*, and particularly (in forty-one per cent. of my cases) with *divergence* (exophoria or divergent squint). The divergence may be due either to a convergence insufficiency, or to a divergence excess, the latter condition being comparatively common. In the cases that I examined, *convergent deviations were less than half as frequent* as the divergent.

10. In anisometropia of low degree there is no special tendency to the development of *hyperphoria.* In high anisometropia, hyperphoria is unduly frequent (occurring twice as often as in low anisometropia).

11. The proportion of cases with *squint* (especially divergent squint) is high, convergent squint being found in eleven per cent., and divergent squint in fourteen per cent. of my cases.

ON TORTICOLLIS IN CASES OF VERTICAL DEVIATION OF ONE EYE.

By Dr. KARL DALLWIG,

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Slightly Abridged Translation by Dr. Ward A. Holden.

IN view of the fact that hitherto few cases have been reported of functional torticollis, due to vertical deviation of one eye, it has seemed to me advisable to describe two cases observed in the eye clinic of Prof. L. Weiss, of Mannheim.

Before, however, entering upon this subject, we may refer to the most important points in regard to torticollis in general.

Torticollis is the well-known oblique position of the head which results from the contracture of the sterno-cleido-mastoid muscle, the head being inclined toward one shoulder, while the chin is directed to the other side and at the same time is somewhat elevated.

As to etiology, the affection is either congenital or acquired. The congenital form is almost always caused by the contracture of the sterno-cleido-mastoid and the other soft parts of the affected side of the neck, and is rarely due to an imperfect development of the atlas and the cervical vertebræ.

The congenital form is distinguished from the acquired in often being hereditary and not infrequently being associated with other deformities.

The most common cause of torticollis is that due to tearing of the sterno-cleido-mastoid muscle during birth. The

pathological changes are chiefly in the sternal portion. There is usually a nutritive shrinking of the contractile substance, or this in part gives place to tendon. The bony skeleton takes part in the changes. There is an asymmetry of the skull, the affected side of the face being swollen and oblique, and there is sometimes curvature of the cervical vertebræ, and a compensatory curvature of the dorsal vertebræ.

The sterno-cleido-mastoid muscle is shorter on the affected side and feels hard. If there has been a rupture, a swelling will be found at that point.

When no callus or scar can be found, another cause than rupture of the muscle must be sought for. Naturally only those cases can be cured by surgical interference in which the muscle is shortened. In other cases one must attack the cause, which may be an affection of the accessory nerve in paralytic torticollis, or inflammatory processes which cause a reflex torticollis.

The variety of torticollis due to a vertical deviation of one eye, and the attempt by the patient to overcome the visual disturbances by holding the head obliquely, was described by Cuignet in 1874, who stated that this was a frequent variety and named it "ocular torticollis."

After Cuignet's publication many cases were reported, in some of which an operation on the ocular muscles relieved the torticollis.

Our own cases were as follows:

Case 1.—F. von L., aged twenty-two. The intelligent patient states that the oblique position of the head was noticed after an attack of scarlatina when he was twelve years old.

He holds his head inclined toward the left shoulder at an angle of about 30° from the vertical. The chin is somewhat elevated and turned to the right. The right half of the forehead stands somewhat higher and the right half of the face is better developed than the left.

No other deformities of the skeleton can be made out. The left sterno-cleido-mastoid muscle feels tense, but neither at the present time nor earlier have thickenings or scars been felt.

When the head is held in the customary position, the patient

has no diplopia, but when the head is held straight he sees double at once. Usually the right eye fixes, and the left eye then deviates downward and outward and the left upper lid droops slightly. The deviation of the left eye is much more marked when the head is held straight.

The mobility of the left eye upward is diminished, and the field of fixation is limited upward and inward. R v = $\frac{6}{vi}$, L v = $\frac{6}{vi}$. J. No. 1, from 35–19 *cm*, both ; interior normal ; hyperopia 2–3 D.

If a colored glass is held before one eye while the head is in the oblique position, double images are seen. They stand vertical, one above the other, with that of the left eye higher. The images are brought together with a prism of 26°. When the head is held straight, double images appear spontaneously. The images are crossed, the lateral distance being 8° and the vertical 38°. The lateral distance increases when the gaze is directed to the left, while the images come together when the gaze is directed to the right. The vertical distance increases in looking up and to the left. The patient states that the vertical separation chiefly annoys him, while the lateral separation causes him little discomfort. For this reason he seeks to reduce the vertical separation by inclining the head. The desired result is obtained by turning the head to the right about its vertical axis and upward about a fronto-occipital axis, the position then corresponding to that produced by contracture of the sterno-cleido-mastoid muscle.

The lesion is a paralysis of the left superior rectus. The indication as regards treatment would be an advancement of this muscle, which Nieden[1] did in a similar case with good result, perhaps combined with a tenotomy of the inferior rectus. In our case no operative procedure could be undertaken.

Case 2.—A. K., aged eighteen. The intelligent patient, a student, always in good general health, states that he has had a torticollis since childhood. In the beginning this was very marked, but has since decreased, and the subjective disturbances have so far disappeared that the patient does not care to undergo an operation.

The head is inclined toward the left shoulder, the chin is somewhat elevated and directed toward the right, the position being that produced by contracture of the left sterno-cleido-mastoid muscle.

The left half of the skull is less developed than the right,

[1] *Centralbl. f. prakt. Augenheilk.*, Nov., 1892.

there being a difference of 1 *cm*. The spinal column is curved to the right, the greatest deviation from the middle line being 2.5 *cm*. The last cervical and one of the last dorsal vertebræ are prominent, and the left shoulder stands higher than the right.

The left sterno-cleido-mastoid muscle feels tense but no thickenings or scars can be detected in it.

When the patient holds his head in this forced position, he has no diplopia, but objects at a distance appear somewhat blurred. When, however, he holds the head straight, double images appear.

Usually the right eye fixes and the left deviates downward and somewhat outward, while the upper lid droops slightly. Occasionally the left eye fixes and the right then deviates upward and outward.

The mobility outward and inward is equal in the two eyes. The excursion of the left eye upward is somewhat restricted, and downward somewhat increased.

The field of vision is normal in both ; the field of fixation of the left eye is upward 40° and outward 45°, slightly restricted.

The width of the palpebral aperture is about 3 *mm* in each eye in the middle.

R v = $\frac{6}{VI}$, with + 2.5 $\frac{6}{VI}$; L v = $\frac{6}{VIII}$, with + 1.5 $\frac{6}{7.5}$. R J. No. 3, from 40–21 *cm* ; L J. No. 4, from 43–30 *cm* ; with + 1.5 J. No. 1, each.

Ophthalmoscopically : normal fundi ; hyperopia about 3. D.

With the head in its oblique position, the patient sees double when a red glass is held before one eye. The image of the left eye is higher and to the left. There is the paradoxical condition of divergence with homonymous diplopia which will be discussed later.

When the light is held 1.5 *m* away on a level with the eyes, the patient estimates the vertical distance between the double images at about 50 *cm*. When the light is carried to the patient's right, both the vertical and the horizontal distance of separation decrease, but when it is carried to the patient's left only the lateral distance decreases. When the light is held 1 *m* higher, in the middle, both the vertical and the lateral distance diminish, and with the light at this height, carried to the left or right, the result is the same as when it is held in the horizontal line, nor was there any difference when the light was held 1 *m* below the horizontal.

A red prism placed base down shows that when the head is inclined the lateral separation is 2°, and when the head is held straight, 3°; the vertical separation is respectively 17° and 23°.

With the Hering test of the falling ball, the patient's answers are uncertain in the first five trials and then constantly correct up to the twentieth trial.

Stereoscopically there is not binocular single vision; both images are perceived simultaneously and separate, the image belonging to the left eye appearing above and to the left as is shown in the following example:

ELI
LISE

As remarked above, the oblique position of the head enables the patient to see without much discomfort, and the fact that the obliquity in which the head is held has decreased in recent years agrees with the fact that the lateral separation of the double images also has decreased from 8–9½° in 1889 to 2–3° at the present time.

By way of treatment, either a tenotomy of a depressor of the left eye or of an elevator of the right. After operation the old habit often persists, and orthopædic measures must be undertaken for its correction and continued for some weeks. Cuignet has recommended the wearing not only of a neck brace, but of an orthopædic corset as well.

At frequent examinations continued over years, the intelligent patient has declared positively that the images were homonymous, and that the image of the flame seen through the red glass is a clear image, and not a blurred one, as is the rule in these paradoxical cases. No satisfactory explanation of this paradoxical condition has been given, but it has been noted that it occurs only in cases of divergent squint.

Perhaps the homonymous diplopia may be explained on the ground that the present slight divergence is to be considered, in comparison with the early excessive divergence, as a relative convergence in which the two retinas appear in new relations of convergence.

Naturally I speak only of such cases as have not been operated upon.

It is worthy of note further that in our ease the lateral

separation of the images has decreased in the course of years, and with this the obliquity in which the head is held has diminished.

Cuignet, in his first paper, described a case of alternating strabismus convergens, with a deviation of the left eye upward and inward, due to a paralysis of the left superior oblique. The torticollis had existed for four years, but there were no anatomical changes either in the skeleton or the soft parts. Cuignet proposed tenotomy with subsequent orthopædic treatment, but this was delayed until the patient was a little older.

In the same year, 1874, he reported a case of left torticollis which was cured by a tenotomy on the left eye. The patient was a woman of twenty who had suffered with this trouble since youth. There were convergent strabismus and tension of the neck muscles.

Cuignet called attention to the fact that this form of torticollis was often confounded with the ordinary form and that it was not so rare as one might suppose.

In 1887, Landolt (*Le Bull. méd.*, 1890, p. 573) described two further cases. Consent to a tenotomy was refused in both.

In 1889, Wadsworth (*Trans. Amer. Ophth. Soc.*) reported two cases and Risley, at the same meeting, one. In 1890, Morosow (*Wratsch*, 1890) described a case in which a tenotomy seemed contra-indicated on account of a disturbance of innervation of all the muscles.

Nieden (*Centralbl. f. prakt. Augenheilk.*, Nov., 1892) was the first German author to report a case due to paresis of the left superior rectus. A. Graefe (*Centralbl. f. prakt. Augenheilk.*, Dec., 1892), criticising Nieden, stated that he believed the case to be one of paresis of the right superior oblique. It is not necessary to discuss this case further, since it agrees essentially with the four other cases reported.

In conclusion, I wish to thank Professor Weiss for suggesting this topic and for assisting me in preparing the paper.

A CASE OF HOMONYMOUS HEMIANOPSIA OF CORTICAL ORIGIN WITH PECULIAR DISTURBANCES IN THE REMAINING HALVES OF THE FIELDS.

By Dr. TH. GELPKE, Karlsruhe.

(*With two figures on Plate VI. of Volume XXXIX., German Edition.*)

Slightly Abridged Translation by Dr. Ward A. Holden.

THE physiological experiments and clinical observations of Munk, Henschen, Flechsig, Nothnagel, Vialet, and others prove without question that all visual impressions are carried from the retina through the optic nerves, tracts, primary optic ganglia, and optic radiations to the cortex of the occipital lobes. In the latter lies the visual centre which by means of numerous groups of association fibres is connected with other centres in the brain. It is still an undecided question, however, in which particular portion of the occipital lobe the visual centre is actually located. Henschen and others believe that it lies in the convolutions bordering the calcarine fissure, the cortex here having a more complicated structure.

Wilbrand and Nothnagel locate the visual centre at the apex of the occipital lobe. Vialet believed that the visual centre occupied the cuneus and the lingual and fusiform lobules.

Another disputed question is whether the centres for light, color, and form are separate as Wilbrand believed. Schmidt-Rimpler and the later writers generally do not accept this view, but regard the cases of partial loss of particu-

lar perceptions as being due to different degrees of injury rather than to different locations of the lesion.

Many of these questions can be settled only by the careful observation of patients whose clinical symptoms can be compared with an injury directly observed or with the changes found post-mortem. In view of the small number of cases which can be studied carefully the following seems to be worthy of record:

On *August 17th* Prof. v. Beck, chief physician of the city hospital, referred to me for ocular examination an Italian, whose clinical history was of great interest both surgically and to the ophthalmologist.

The patient had fallen June 1st from the flies of a theatre striking the back of his head upon an iron rail. He was carried unconscious to the surgical division and the following record was made:

Pupils dilated ad maximum; deep snoring respiration; pulse frequent and weak. In the occipital region, extending over into the left parietal region was a lacerated wound 10 *cm* long, beneath which the skull was splintered over an area 4.5 *cm* in diameter. Body temperature 36.5°.

After careful cleansing and disinfecting of the wound the defect in the soft parts was enlarged and seven splinters of bone were removed, some of which had been forced deep into the occipital lobe. The posterior-inferior portion of the left occipital lobe was completely crushed, but the upper convolutions were apparently unharmed. The right occipital lobe superficially exhibited no injury. The wound was carefully cleaned and washed out with salt solution, and the posterior branch of the middle meningeal artery, which was spurting, was tied. Finally, the wound was tamponed with iodoform gauze and an antiseptic dressing applied.

For three days the patient remained unconscious, and it was necessary to catheterize the bladder. The temperature varied between 38° and 38.5°. On the fourth day the patient's mind became clearer, but he was restless and the temperature rose. When the dressing was removed, there was discovered a marked prolapse of the partially necrotic brain matter. On the sixth day the patient was dull and the temperature rose to 40°. On the seventh day there was twitching of the right side of the face, right arm, and

right leg. The pulse sank to 54. Stertorous breathing. The brain greatly prolapsed, of dark bluish-red color, and tense. In order to give exit to the cerebro-spinal fluid the attending surgeon passed his finger through the necrotic brain mass and opened the posterior cornu of the left lateral ventricle into which a drainage tube was passed. Through this tube about 100 *cc* of cerebro-spinal fluid containing leucocytes and staphylococci escaped.

The following day the general condition was improved. The pulse rose to 120, the temperature fell to 39°, the twitching ceased.

In the next five weeks the prolapse diminished in size and the tube was left out. The defect in the skull became smaller until only a fistula remained. The patient's intellect was well preserved, but his memory for things that had happened before his injury was poor. His knowledge of German was less than before. The names of his relatives and friends were forgotten. He could not recall the names of the streets (amnesic aphasia).

It was noticeable, too, that his power of orientation was weakened, and he often became lost in the streets. The power of speech was in nowise affected. He read and repeated words correctly, although he gave one the impression of not wholly understanding what he read and he could not tell afterwards what he had been reading.

There were no disturbances of motility or sensibility. Hearing, smell, and taste remained normal.

Although this case was one of great surgical interest, the visual disturbances present rendered it of still greater ophthalmological interest. With the first recovery of consciousness, it was found that there was right homonymous hemianopsia. On August 27th, when I made for the first time a careful examination, the condition was as follows: Movements of the eyes normal. Pupils of medium size, equal, and responsive to light thrown from any direction; no hemianopic reaction. Acuteness of central vision normal and accommodation good. Fundus in every respect normal. Examination of the fields of vision showed an absolute right hemianopsia, even a light not being seen in the right halves of the fields. The left halves, however, were not complete, but showed a contraction of the concentric type. A small flame was seen in the light areas (Plate VI.).

A white test-object 1 *cm* square was seen up to the outer dotted line. The form of a small test-object, triangular or square, could be determined only up to the next broken line. A white test-object 5 *mm* square was seen only in a smaller area, and the fields for blue, red, and green were still further contracted in their natural order.

Colors were matched correctly and promptly, but the patient was puzzled in naming them, although he was always able, when a given color was shown him, to name some other object of the same color. For example, when an intense blue yarn was given to him and it was asked what this color resembled, he replied at once, "il cielo," but he could not tell what the color should be called.

The patient thus appeared to have a motor alexia for colors, combined with the amnesic aphasia (absence of the sound images) described above. In an examination of his color-sense before the injury, he named every color correctly.

The case then was one of comminuted fracture of the whole left portion of the occipital bone, with some injury to the left parietal bone, a complete destruction of the lower convolutions of the left occipital lobe, and a transient accumulation of cerebro-spinal fluid in the ventricles. The permanent results of the injury were a mild form of amnesic aphasia, disturbance of orientation, and defective visual fields.

There is here no question but that the homonymous hemianopsia is due to a lesion of the left cortical visual area, and not to any interruption in the conducting tracts, for the normal pupillary reaction and the normal appearance of the optic disks speak against pressure on the optic tract, and the absence of motor disturbances indicates that the basal optic ganglia and the optic radiations are not affected.

How is the contraction of the remaining halves of the visual fields to be explained? It must be due either to a *functional* weakness in the right cortical visual area (consecutive to the lesion on the other side or arising from the pressure of the distended ventricles) or to an *actual* lesion of the visual area which could not be recognized externally.

The amnesic color-blindness, or, better, the motor alexia

for colors, must be regarded as being analogous to amnesic aphasia, being due to an interruption of conduction between the visual centre and the speech centre.

More difficult to explain is the disturbance in orientation observed in our case. In his own room, his power of orientation seemed not to be affected, but upon the street he soon became lost. Contraction of the visual fields of itself does not cause disturbances of orientation. There have been many theories advanced to account for this disturbance, the most plausible being that of Peters. He does not locate the centre for orientation in the cortex of the occipital lobe, but believes that the power of orientation depends upon the presence of association fibres which run near the middle line in the region of the commissure and bring visual impressions to perception in the fore-brain. Such association fibres could, in our case, have been injured by the pressure of the dilated ventricles.

This case with complete right hemianopsia and partial left hemianopsia, complicated with amnesic color-blindness and defective power of orientation, has a special interest, since search of the literature has revealed no other case like it.

BIBLIOGRAPHY.

1. FOERSTER. Ueber Rindenblindheit. *Arch. f. Ophth.*, Bd. xxvii., 3, 94.

2. SCHWEIGGER. Ein Fall von beiderseitiger Hemiopie. *Arch. f. Augenheilk.*, Bd. xxii., p. 336.

3. GROENOUW. Ueber doppelseitige Hemianopsie centralen Ursprungs. *Arch. f. Psychiatrie*, Bd. xxiii., p. 339.

4. SCHMIDTR-IMPLER. Doppelseitige Hemianopsie mit Sectionsbefund. *Arch. f. Augenheilk.*, Bd. xxii.

5. PETERS. Ueber die Beziehungen zwischen Orientirungsstörungen und ein und doppelseitiger Hemianopsie. *Arch. f. Augenheilk.*, Bd. xxxii.

6. MANZ. Casuistik der doppelseitigen homonyme Hemianopsie. *Arch. f. Augenheilk.*, Bd. xxxii.

7. KÜSTERMANN, R. Ueber doppelseitige homonyme Hemianopsie und ihrer begleitenden Symptome. *Monatsschrift für Psychiatrie u. Nervenkr.*, 1897, p. 335.

8. SCHMIDT-RIMPLER. Erkrankungen des Auges im Zusammenhange mit anderen Krankheiten. Wien, 1898 (und die daselbst citirte Litteratur).

9. WILBRAND. Ophthalmiatrische Beiträge zur Diagnostik der Gehirnkrankheiten. Wiesbaden, 1884.

10. GAFFRON. Ein Fall von beiderseitiger homonyme Hemianopsie. *Deutschmann's Beiträge z. A.*, Bd. i., 5.

ON TRAUMATIC DEGENERATION OF THE RETINA.

By Prof. E. ADAMUCK, Kasan.

Translated by Dr. Ward A. Holden.

(*With three figures in the text.*)

TWO years ago I had intended to prepare a paper on a traumatic affection of the retina, but other labors prevented, and in the interval Hippel[1] described the same changes in the retina that I had observed. It is desirable, however, that more observations should be reported, and I therefore relate the history of my case.

It has long been recognized that foreign bodies in the interior of the eye may give rise to iritis, cyclitis, sympathetic inflammation, and detachment of the retina, but it has only recently become known that foreign bodies after remaining for a length of time in the eye bring about more or less marked changes in the retina. It has long been observed that foreign bodies remaining in the retina near the macula cause changes at the macula with central scotoma, but that foreign bodies in the retina may cause without inflammation a degeneration of distant portions of the retina is of more recent observation.

My case was as follows:

D. K., a schoolboy of fifteen, was brought to me in the beginning of April, 1881, with an injury of both eyes which at first seemed of no great importance. A percussion cap of a pistol on exploding splintered and flew into the face. When I saw the patient a week after the injury, there was slight hyperæmia of the

[1] *Graefe's Archiv*, xlii., 4, 1896.

conjunctiva, contracted pupils, and normal cornea, iris, and anterior chamber. In the left eye there was a gaping wound in the sclera 5 *mm* from the external margin of the cornea, and in the right a gaping wound 4 *mm* from the lower margin of the cornea. Vitreous protruded from these wounds, but the patient had no subjective symptoms, and the interior of the eyes, including the fundus, seemed to be entirely normal. The vision was $\frac{20}{40}$ each, but the patient stated that it had not been better before the injury. While no foreign bodies could be discovered in the eyes, it was probable that foreign bodies were present, and hence an unfavorable prognosis was given.

Three weeks later the patient returned with a well-marked irido-choroiditis in both eyes which had commenced some days before. Atropine, mercury, and warm fomentations were used, but the affection lasted for months, when the vitreous became clear enough to permit an ophthalmoscopic examination. The right eye now had vision $\frac{20}{200}$, while the left eye was blind. Ophthalmoscopic examination revealed a total detachment of the retina in the left eye and detachment of half the retina in the right. The eyes were then bandaged and iodide of potassium prescribed. Some months later the retina became attached everywhere in the right eye and in the upper-outer portion of the fundus in the left. The reattachment of the retina in cases of foreign body in the eye is very unusual and its possibility has been denied.

The condition of the eyes remained the same for years, until later the lens grew cloudy in the left eye and finally became entirely opaque. In the right eye vision remained unchanged, and continued so, although the patient hunted a great deal and often was thrown from his horse. Frequent examinations of the field of vision gave constant results, the extent of the field being shown in Fig. 1. No foreign body could be discovered in the interior, the only possible indication of the presence of one being a pigmented spot in the periphery of the fundus near the scleral wound.

Nine years after the injury the patient's vision began to fail, particularly in the centre, and spots and lines were seen about any point fixed. There were no external changes or signs of hyperæmia of the eyes, and the tension of the right eye was unchanged. In the left eye the cataract appeared as before, the pupil was moderately dilated, and the tension was somewhat diminished. In the right eye vision had sunk from $\frac{20}{40}$ to $\frac{18}{200}$.

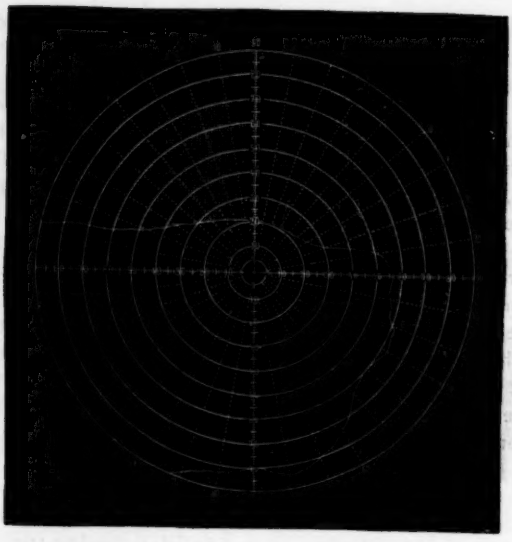

FIG. 1.

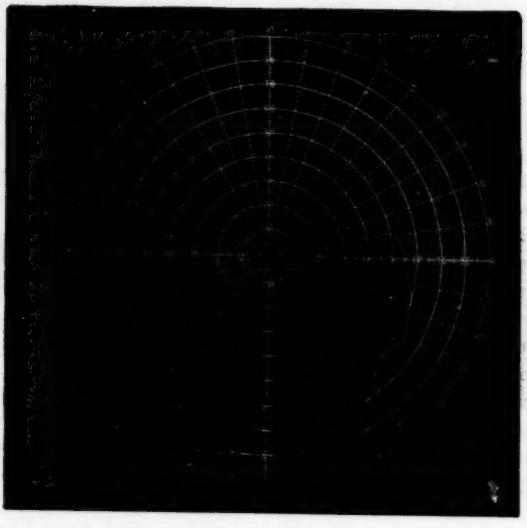

FIG. 2.

The disk was reddened and blurred, indicating a simple neuritis. About the macula were radiating white spots and lines suggestive of retinitis albuminurica. The patient presented no evidences of syphilis. Perimetric examination revealed a marked limitation of the field where it had been contracted before from the retinal detachment, and the blind portion now extended in a ring about the point of fixation (see Fig. 2). Mercury, atropine, and a bandage were employed and vision improved to $\frac{8}{10}$, although the field remained unchanged. The disc came to have a more nearly normal appearance.

In the course of the following year vision fell to $\frac{1}{10}$, and a year and a half later to $\frac{1}{200}$ with some further contraction of the field. Pigmentation of the retina now developed rapidly, and the fundus picture suggested retinitis pigmentosa, while the disc appeared atrophic. There was, however, no evidence of hemeralopia. Some months later the field was found to be further contracted, as is shown in Fig. 3. Five weeks after this hemeralopia developed,

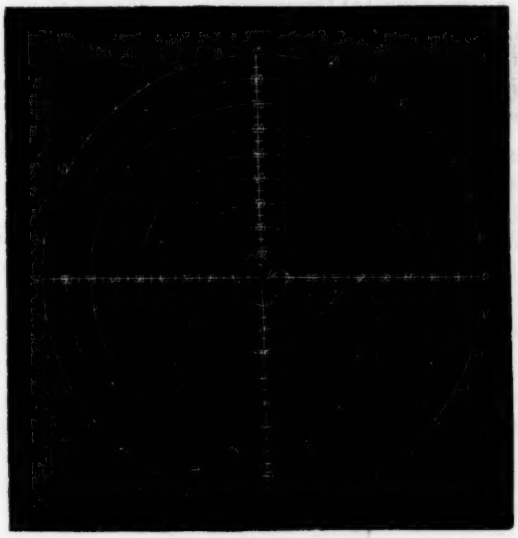

FIG. 3.

and the patient was almost blind at night, while in the day vision was as before, but soon vision began to fail and he became

perfectly blind. Shortly after, he died of typhoid fever, and unfortunately the eyes could not be obtained for examination.

It is now certain that a foreign body remaining in the eye, although it be aseptic, will by its chemical effect on the neighboring tissues sooner or later bring about important changes in the eye as follows: (*a*) it may cause severe inflammation, necessitating enucleation; (*b*) it may cause detachment of the retina; (*c*) it may bring about changes in the macula similar to those observed in albuminuric retinitis; and finally (*d*) it may cause the retina to be infiltrated with pigment with visible signs of inflammation in the vessel walls. All these changes occurred in our case and in a particular order. At first the foreign bodies were tolerated for a month without any inflammatory reaction. Then, probably in consequence of the chemical irritation of the copper, an inflammation of the choroid appeared. From this a detachment of the retina developed, which by treatment was cured in the right eye but persisted in the left. After this for several years there was no change, the eyes having adapted themselves to the presence of the foreign bodies. A later chemical action, however, led to total degeneration of the retina and infiltration with pigment, and to considerable disturbance of vision, and finally, before the patient's sudden death, to almost complete blindness.

The lesson to be learned from such cases is that foreign bodies which may undergo chemical degeneration, whether they be of iron, copper, or other substances, should be removed from the eye in the beginning, because while they may lie dormant, and vision continue good for a time, there will eventually occur a degeneration of the retina with progressive diminution of vision.

REPORT OF THE OPHTHALMOLOGICAL SECTION OF THE BRITISH MEDICAL ASSOCIATION.

MEETING AT CHELTENHAM, JULY 31 AND AUGUST 1 AND 2, 1901.

By C. DEVEREUX MARSHALL, London.

Superficial punctate keratitis associated with an encapsulated bacillus.—Major H. Herbert, I.M.S., has noticed minute spots on the cornea, some of which are elevated and some depressed. They stain well with fluorescine and are accompanied with slight inflammatory symptoms. The duration of the affection is usually two or three weeks, and is almost invariably confined to one eye. It usually affects young adults. In the scrapings from the epithelium are found bacilli which are enclosed within a capsule and which stain only with difficulty and not at all with Gram's solution. They are generally grouped together and are not spread uniformly about the epithelium. Neither culture nor inoculation experiments have proved very satisfactory.

Mr. Devereux Marshall said that he did not think it was yet proved that the organism described was the cause of the disease.

Mr. Blair thought it resembled Fuch's keratitis.

The President did not feel sure about the specimens shown, and he wished that the term "keratitis punctata" as applied to the dots seen on the back of the cornea could be done away with, as it led to so much confusion.

Symmetrical bullous keratitis in both eyes.—Mr. Tatham Thompson described this case. The patient was a man aged twenty-two, who had, when first seen, intense pain and photophobia for three weeks. There was general conjunctival injection and on both corneæ a ring of bullæ radiating towards the periphery, the centre of the cornea being clear. Almost everything

was tried, but with little success. Under atropine and cocaine, accompanied with douching with formol 1–5000, the condition gradually subsided and the patient resumed his work four months from the onset and has not since had a recurrence. A ring of semi-opaque spots marked the sites of the spots. As there was considerable frontal neuralgia in the early stage it may have been of herpetic origin.

Mr. CHARLES BLAIR described an unusual form of keratitis associated with a skin eruption which occurred in a boy aged eighteen. On the inner and outer side of each cornea was a raised swelling which looked almost like a new growth, although it had not altered much in two years. There was no corneal nor conjunctival lesion. Exacerbations take place at intervals, and at these times a papular eruption occurs on the face. Mr. Blair thought that the two conditions were associated and were the result of a common cause.

Mr. DEVEREUX MARSHALL suggested that it was possibly of a tuberculous nature.

Mr. BLAIR thought this possible, as the patient was a strumous character. He, however, had watched the case for four years and the condition had not materially altered, and this he thought rather against this view.

Periscopic glasses.—Mr. A. S. PERCIVAL, having regard to the very imperfect periscopic glasses usually sold as such, and the great advantage to be gained from them by enlarging the field, has gone into the question carefully and has calculated the form of lens which shall be applicable to most cases and approximately periscopic. This can be fairly accurately done in lenses up to + or − 10 D. Above this the glasses cannot be so accurately made, although even here they are very much better than the ordinary biconvex or concave lenses. He then showed a chart which graphically demonstrated the advantages. He had now used many of them, and they were not only mathematically correct but had given complete satisfaction to the wearers.

The PRESIDENT complimented Mr. Percival on his work and thought that if an improvement could be effected in the high glasses it would be a great gain.

In reply to Mr. TATHAM THOMPSON, Mr. PERCIVAL stated that the cost for grinding these lenses was not very much greater than the ordinary ones. (See the publication in extenso, these ARCHIVES, p. 520, September No., 1901.)

Discussion on the diagnosis, prognosis, and treatment (non-operative) of progressive myopia.—This discussion was opened by Mr. PRIESTLEY SMITH, who took as a basis one hundred cases of myopia, some innocent and some malignant, but in all they had myopia of at least 1 D. He laid great stress on the fact that there was no positive line of demarcation between one class of cases and the other. He then discussed the cases under the following six headings:

(1) *Age.*—The younger the patient when the myopia develops the more likely it is to increase. The majority of cases come to a standstill between the ages of fifteen and twenty-five.

(2) *The Degree of Myopia.*—The higher it is the more likely it will be to increase. A child who has 10 D when ten years old is likely to have 20 D when ten years older.

(3) *The State of the Choroid.*—The higher degrees are to be feared less even than the lower if in the latter the choroid and retina are affected. We first get the typical crescent, which may lead on to thinning of the choroid and changes at the macula. The congestion and abnormal conditions soon lead to yielding of the sclerotic and a rapid increase of the myopia.

(4) *Constitutional Changes.*—These are of the utmost importance, and myopia frequently follows grave constitutional disturbances and diseases causing high arterial tension.

(5) *Evidence of Heredity.*—This is sometimes very marked, and as a rule in these cases, although the degree may be high, yet fundus changes are not so frequently met with, and therefore with a strong family history the prognosis is, as a rule, better.

(6) *Occupation.*—This is of great importance. Excessive close work develops or aggravates it, and a person developing the disease should never be put to work necessitating this, at least not until any tendency to increase has been checked.

Mr. PRIESTLEY SMITH concluded by saying that we should suspect all myopes of having a tendency to increase the disease, and therefore the utmost care should be exercised in preventing its development.

Mr. A. S. PERCIVAL considered the oblique muscles very powerful ones in developing myopia, and as these were brought into play when looking downwards, he thought that books should be arranged so that the patient could look straight ahead when reading.

Mr. HENRY POWER said that good light was essential, and the

head should not be bent over work. The diet of the patients should be good, and no work should be done before breakfast.

Dr. DARIER (Paris) had found that massage greatly improved myopic cases, and after it slight cases could often see as well without their glasses as they could previously with them.

Mr. A. H. THOMPSON thought that a line of distinction could be drawn between cases where there was a well-defined crescent only, and those in which the atrophic process had extended on to the surrounding choroid. He thought that all low cases should be corrected.

Mr. EALES thought that myopes could be divided into two classes with regard to their accommodation. Those who had a normal or excessive amount should be fully corrected for all purposes, but, should it be weak, special reading-glasses should be given. He approved of correcting all cases. Often prisms were of great service, and careful attention should be given to the centring of spectacles.

Mr. DYKES BOWER thought that reading by a dim light, and the habit so often acquired by myopes of holding the object looked at too close to the eyes, was most detrimental. He disapproved of myopes using gymnastic exercises which involved holding the head down.

Mr. MADDOX thought that fatigue of the eyes played a most important part in the development of the myopia. The larger the eye the greater would be the tendency for it to stretch still further. When the patients developed a tendency to look sideways through their glasses this should be met by increasing their strength. He thought that it was the inferior recti rather than the obliques which tended to elongate the globe.

Dr. BATTEN spoke of the association of myopia with various constitutional diseases, and strongly recommended regular muscular exercises combined at times with massage.

Mr. TATHAM THOMPSON fully corrected his cases as soon as possible, so that they should not get into the habit of holding their books too close to their eyes. This habit was extremely difficult to get out of if once it had been acquired.

Mr. PRIESTLEY SMITH in reply said that he did not consider muscæ of much importance unless they could be seen with the ophthalmoscope. Although massage might be good he should be very careful not to subject a weak myopic eye to much pressure.

Mr. BLAIR showed a new portable refractometer.

Mr. ROLL read a paper on Hess's operation for ptosis and showed pictures of several cases on which he had operated. He suggested as a modification that the supporting sutures should be of fishing gut and should be inserted nearer the edge of the lid than Hess recommended.

Mr. R. J. COULTER showed some interesting visual fields illustrative of organic as well as of functional diseases. He advocated the use of a black spot when taking fields on the perimeter.

Mr. HARTRIDGE very much wished that people would when taking fields state on them the size of the object used on the carrier.

Mr. HENRY POWER read a paper on a plea for the occasional performance of depression for the cure of cataract. He stated that although it had been superseded by extraction yet it was an operation which had for years been practised with very fair results. He had seen his teachers do it and had sometimes done it himself, and he thought there were still some conditions which made it desirable to perform it even now ; he was sure its dangers had been much exaggerated. He thought it might be undertaken in very old and feeble persons when a wound would be likely to heal badly, in cases where there was chronic conjunctivitis or mucoceles which did not yield to treatment, in deaf people, in lunatics, imbeciles, and in those suffering from chronic bronchitis, in cases of tremulous lens with fluid vitreous, in those who had already lost one eye from an unsuccessful operation, and lastly in those suffering from hæmophilia or epilepsy. The way he operated was to puncture the sclerotic, divide the posterior capsule of the lens, and then depress the cataract.

Colonel POYNDER, I.M.S., said that in India he had come across a great many cases of couching done by natives, and although he had seen many failures yet these were the only cases that ever came under observation. He was sure, however, that there must be a large proportion of successful cases or the operation would not retain the reputation it does.

Mr. RICHARDSON CROSS had done the operation in a case of tremulous iris with a good result.

Mr. DYKES BOWER thought that the needle might easily break

up the lens, and also thought that the loose lens might quite likely get into the pupil or the anterior chamber.

Mr. ROLL had accidentally done the operation when endeavoring to extract a lens. The eye had done well for a time, but subsequently he had to remove the lens and a good result followed.

Mr. TATHAM THOMPSON did the operation in a very stout bronchitic man eighteen months ago. It immediately gave a good result and the sight still remains quite good.

Mr. POWER briefly replied.

Notes on ophthalmic experience in the Imperial Yeomanry Hospital in South Africa.—Mr. L. V. CARGILL, who was attached to this hospital, read an interesting paper on his experiences and described in detail several cases illustrating different types of eye-injury. He showed museum specimens of eyes, as well as fragments of bullets which had caused wounds. He stated that shells very seldom damaged an eye without at the same time doing such extensive injury that the eye was of little moment. In some cases the cervical sympathetic was wounded.

The relation of gonorrhœa to diseases of the eye exclusive of purulent ophthalmia.—Mr. J. B. LAWFORD opened this discussion. He pointed out the extremely far-reaching nature of these complications which were really not far short of those of syphilis. The iritis was of a severe type, but although the gonococcus had been found in inflamed joints yet he was not aware that it had ever been found in the eye. Modern observations tend to show that a slight conjunctivitis may be set up which is not due to direct infection. In many cases iritis and iridocyclitis occur with the arthritis, though it is not invariably so. Both are prone to relapse without fresh infection.

Scleritis and episcleritis are not so common, while retinitis and neuro-retinitis are still less frequent. One or two cases of bilateral infection of the lachrymal glands have been recorded.

Dr. YELD had analyzed 159 cases of primary iritis. In 56 non-syphilitic cases 28, or 50 per cent., gave a history of gonorrhœa. Of these 28, 26 had a history of arthritis past or present, while in 13 of these the association of gonorrhœa, arthritis, and iritis was so close as to justify the term gonorrhœal iritis. The figures work out as 8 per cent. of all cases of primary iritis.

Dr. DARIER had seen many cases of iritis associated with metritis which had not yielded until the uterine trouble had been treated.

Mr. HENRY POWER thought that, considering the enormous number of cases of gonorrhœa there were, the eye trouble following it must be very rare.

Colonel DRAKE-BROCKMAN had seen much of this disease in India and he had often seen iritis associated with ordinary gonorrhœal ophthalmia.

Mr. SYDNEY STEPHENSON had seen recently two cases of arthritis following gonorrhœal ophthalmia in children.

Mr. DEVEREUX MARSHALL described the typical transparent exudation present in the anterior chamber. He had never had an opportunity of examining the contents of the chamber for gonococci in these cases.

Mr. CARGILL drew attention to the large number of cases of so-called rheumatic iritis in which there was a history of gonorrhœa.

Mr. LAWFORD replied.

Treatment of hypopyon ulcers of the cornea.—Mr. R. J. HAMILTON read this paper. He was a strong advocate for the removal of blood from the vessels of the conjunctiva near the ulcer as well as for the application of leeches to the outer canthus. The actual cautery was of the utmost value and gave the patient great relief. A few drops of castor oil with or without iodoform was very useful. Sores in the nose or blenorrhœa of the lachrymal sac should receive prompt attention.

Mr. RICHARD WILLIAMS said that years ago he came to the conclusion that the old treatment of letting out the hypopyon in every case was bad, and now he seldom does it except in severe cases, and then he lets it out by means of a linear incision running vertically upwards from the lower part of the cornea, and for making this incision he had introduced a special knife. He thought that Saemisch's section was a bad one. Quinine as a lotion he thought useful, but he did not think that atropine helped much unless there was iritis. He often found the cautery fail.

Mr. TATHAM THOMPSON stated that in the colliery districts these ulcers were very common and he thought that the vitiated air of the mines had a good deal to do with it. Since the introduction of formalin he had almost discarded the cautery and such-like treatment. He preferred to wash the eye with formol 1 in 10000 and sometimes to paint the ulcer with formol. Atropine and iodoform ointment was then applied and the eye tied up and douched frequently with weak formol. The patient should be encouraged to take fresh air.

Mr. HUGH JONES thought the cautery often failed to arrest the disease and left a dense opacity behind. He much approved of Mr. Williams's incision, and also thought quinine, iodoform, and perchloride of mercury were of great value.

Dr. DARIER thought that there was nothing so effectual as the galvano-cautery; it should be used carefully and thoroughly. In some cases subconjunctival injections of cyanide of mercury were useful.

Mr. DYKES BOWER agreed as to the great value of the galvano-cautery, and this, combined with fluorescin so as to mark out the exact limitations of the ulcer, was of the utmost value. He disapproved of applying any dressing and was disappointed with most agents used as applications.

Mr. R. J. COULTER showed some interesting visual fields and described cases from which they had been taken, the patients suffering from organic and functional diseases.

AUGUST 2, 1901.

Mr. EDRIDGE GREEN read a paper on **the essentials of a test for color-blindness.** He mentioned the fact that many normal-sighted persons were excluded and failed to pass Holmgren's test, and also at least three dangerous forms of color-blind people could not be detected by this means. He strongly advocated the naming of colors when testing candidates.

Mr. DEVEREUX MARSHALL said he agreed with Mr. Edridge Green and mentioned a case in which a person could easily pass Holmgren's test and yet be so deficient through shortening of the red end of the spectrum that with a lantern he could not see a dim red light which was perfectly visible to a normal-sighted person; such a man would be a great source of danger if placed as "a lookout" on a vessel or on the railway.

Mr. HARTRIDGE read a paper on **the various preparations of silver used in ophthalmic work.**

Actol is a lactate of silver which he had not found of much use.

Itrol is a citrate of silver; it is a good antiseptic, with considerable penetrating power.

Argonin contains 4% of silver, and is inferior to protargol.

Argentamin contains only 2.6% of silver, and is feeble.

Nargol contains 10% of silver, and possesses many of the properties of protargol. It causes no pain and is less sticky than protargol. It is very useful in conjunctival and lacrymal cases.

Largin contains 11.8% of silver, but it does not keep well and is uncertain in its action. In trachoma and lacrymal cases it works well.

Protargol is one of the best known preparations and contains 8.3% of silver. 10% of protargol is equal to 2% of nitrate of silver. It has great germicidal properties.

Dr. DARIER read a paper on **the latest therapeutical discoveries in ophthalmology.** He thought that protargol was far better than nitrate of silver in children, as it was likely to do far less harm than the inorganic salt.

Epinephrin, or the extract of supra-renal capsule, has a most marked effect in constricting the vessels and thus allowing operations to be done with a minimum of bleeding. It aids the action of atropine and lowers tension in glaucoma. It is very useful in all forms of keratitis, in iritis and glaucoma.

Acoin when used with a subconjunctival injection renders that injection painless.

Dionin assists the action of atropine and relieves the deep-seated pain of iritis and glaucoma. In some people, especially in the gouty and those suffering from kidney disease and struma it causes chemosis of the conjunctiva.

Mr. J. A. BOWER made some remarks on the action of an extract of supra-renal gland in ophthalmology. Finding it extremely difficult to preserve, he prefers a fresh macerated solution of the gland. He has found it most useful in cases of hay fever with conjunctival irritation, both as a nasal spray and as applied direct to the conjunctiva. In corneal ulceration it was to be avoided.

Dr. GRAINGER was much impressed with the beneficial action of the extract of the supra-renal capsule. It contained both a pupil-dilating and contracting substance. Dionin he thought very useful for diagnostic purposes.

Dr. MADDOX said he had recently done an excision under cocaine with supra-renal extract used as well, and he was much struck with the small amount of hemorrhage as well as the complete anæsthesia.

Messrs. SYDNEY STEPHENSON and GEORGE CARPENTER read **a note on tuberculosis of the choroid.** They described the various tuberculous lesions met with and showed drawings of them. In some cases the disease quieted down and the patients recovered. The PRESIDENT and Mr. PERCIVAL described cases they had seen, while Mr. DYKES BOWER made a few remarks.

The discussion of the **varieties and treatment of after-cataract** was opened by Mr. RICHARDSON CROSS. He thought that there was no known means by which after-cataract could always be avoided. He did not advise very early needling, as it is always uncertain how much will absorb. For ordinary cases a Bowman's needle with a cutting edge is sufficient, and if this fails a second cutting-needle should be used. If the membrane be too tough capsule scissors are necessary, and as a last resort capsule forceps may be used to withdraw the membrane.

The PRESIDENT thought that a very sharp ground-down Graefe's knife was, as a rule, better than a needle; he also thought that a secondary cataract was less liable to form after the simple extraction than after extraction with iridectomy.

Dr. DARIER thought that in needling it was most important not to go deeply into the vitreous, and he described a needle he had introduced.

Mr. DEVEREUX MARSHALL thought the operation dangerous, yet he much preferred to do it fairly soon after the extraction if it were certain it would have to be done at some time or other.

Mr. TATHAM THOMPSON preferred dividing the capsule with a knife rather than with a needle.

Mr. DYKES BOWER had a dread of needling and avoided it when he could.

Mr. POWER was also impressed with its danger.

Messrs. ROLL, CARGILL and HARTRIDGE also made remarks.

Mr. RICHARDSON CROSS briefly replied.

REPORT OF THE MEETING OF THE OPHTHALMOLOGICAL SECTION OF THE NEW YORK ACADEMY OF MEDICINE, HELD ON MONDAY EVENING, MAY 20, 1901.

By Dr. HENRY H. TYSON, Secretary.

DR. JOHN E. WEEKS, CHAIRMAN.

Dr. C. Koller presented a **model of a corneal microscope with focal illumination.** The instrument consisted of a 1″ lens, at one side of which a parabolic reflector was attached so that the axis passed through the focus of the lens intersecting the optical axis of the lens at an angle of 80°. A little incandescent lamp in the focus of the paraboloid acts as the source of light. The illumination is to come from the temporal side, and therefore is made reversible, for use on either eye. A dry-cell battery supplies the electricity for the incandescent lamp. The enlargement obtained was stated to be about 12–14 compared with ordinary reading-distance. The advantage of the instrument is that he has endeavored to combine condenser and magnifying lens in such a manner that the light is concentrated upon the focus of the magnifying lens.

Dr. H. Knapp presented a patient, a woman, age thirty-five years, with **adenoma of the Meibomian glands.** He had made some remarks on the case at a previous meeting, Dec. 17, 1900 (vide Arch. of Ophth., vol. xxx, p. 179). The disease began with a nodular thickening in the tarsus of the right upper lid, extensive portions of which had been removed from time to time; under the microscope they showed the picture of an adenomatous growth. The neoplasm had gradually replaced the entire tarsus, and had partially sloughed. At present, the upper part projected over the healthy eyeball like a large, thick visor protecting the

cornea. As the same disease in a more advanced case, which was presented to this section by Dr. J. M. Mills at its February meeting, had assumed the character of an adeno-carcinoma, he proposed to remove the tumor of the present case in its entirety.

Dr. A. N. ALLING presented a specimen of **tubercle of the iris** with history of the case. He stated that the patient, a girl aged six years, was first seen last November. The left eye showed hypopyon and a muddy-looking iris, with a number of small gray nodules on the iris. The diagnosis of tuberculous iritis was made at that time. Knowing the possibility of spontaneous recovery, the eye was watched, but became gradually worse. The sclera began to bulge, and finally a mass of granulation tissue broke through.

He reported also a case of a boy, age six years, who had a nodule upon the iris, which disappeared, leaving only a cicatrix with the pupil slightly drawn toward the affected side.

Dr. C. KOLLER presented a patient with a **cyst of the vitreous located at the optic disc** (R eye). Patient was a man, age thirty-two years. General condition normal. The eye externally was of normal appearance, V. 6/6. Color-perception good. Field of vision was defective in the lower nasal quadrant. It resembled the field in cases of thrombosis of one of the branches of the central artery. The ophthalmoscope revealed an optic disc, the nasal side and lower two thirds of which appeared to be hidden by a dazzling white, egg-shaped body, whose axis was almost vertical, being slightly oblique, the upper more pointed pole leaning towards the nose. The cyst presented a sea-green tinted appearance, with some spots of a white, opaque, chalky look. It had three processes, the two short ones ending not far from the upper part of the disc, each pointedly drawn out, as it were, into the sheath of a blood-vessel. The third one, starting from the anterior surface not far from the lower pole, presented the well-known appearance of a persistent hyaloid artery, and ended (blindly) near the lower nasal quadrant of the lens. The cystoid body described was evidently a widening of the hyaloid artery with its connective-tissue sheath at its posterior extremity, where it emerged from the optic nerve. (There are very few cases mentioned in literature similar to the foregoing.) The cysts described in literature appear to owe their origin to some irregularity in the development or in the disappearance of the hyaloid artery. But Dr. Koller states that the connection of these cysts with a persis-

tent hyaloid was not evident except in the two cases of Hill Griffith, which seem to be exactly the counterpart of his case. (Hill Griffith states that "the remains of the hyaloid artery may assume a cystic appearance, either as small, round, steel-gray bodies attached to the disc or as much larger globular formations.")

Dr. SCHAPRINGER referred to a similar case described by Von Graefe as cysticercus, but which later was proved to be a congenital anomaly.

Dr. KNAPP mentioned a case which at the time puzzled him, but which was a similar condition and, no doubt, a similar case.

Dr. C. H. MAY presented a patient upon whom he had performed a successful **transplantation of a large Wolff graft, forming a new lining of the orbit and permitting the wearing of an artificial eye.** (Reported in full in the preceding number of these ARCHIVES.)

Dr. C. H. MAY also showed a patient upon whom he had operated four years ago, creating an upper and lower cul-de-sac completely lined with Thiersch grafts; the operation was done to correct total symblepharon and to permit the wearing of an artificial eye. The results had been permanent, and the patient was exhibited to show the lasting effects of such operations.

Dr. E. L. MEIERHOF presented a **case of permanent conjugate deviation** with the following history: He stated that the patient was thirty-one years of age; when four years of age she fell out of a window, a distance of two stories, on to a rocky surface, striking the back of her head. There was no external evidence of injury, except that she was unconscious and remained so for five hours. When consciousness returned, it was discovered that she could not see. She was then kept in bed for two weeks. No other disturbance was noticed, such as interference with motion or loss of sensation.

Shortly after leaving her bed, the deviation of her eyes was first discovered, and it has remained so ever since, without intermission. At the present time both eyes deviate to the left during fixation, but by an effort the patient can at times carry the eyes beyond the median plane some distance to the right.

The movements upwards and downwards are quite limited, although rotation seems fairly well preserved. In attempting to move the eyes beyond the median plane, the right eye abducts better than the left. There is some exophthalmos and partial atrophy of both optic discs with vision $\frac{5}{200}$ in each eye. Aside

from the ocular disturbance, no other organ or part of her body seems to be involved as the result of her injury. The case is unique, inasmuch as cases of this character are usually accompanied by motor or sensory disturbances of other parts, as conjugate deviation is quite a common accompaniment of injuries or other lesions of the brain, though the disturbance is, as a rule, transitory. It is remarkable that such an injury to the brain, as would cause partial optic atrophy and permanent conjugate deviation, should not have produced some other accompanying disturbance.

Dr. LESZYNSKY stated that the patient had some nystagmus, but that the condition of the eyes did not correspond to that of conjugate deviation, but to a paralysis of the right rectus externus, and that he would not consider it to be a case of conjugate deviation.

Dr. WEEKS read a report of a case of **xerosis conjunctivæ epithelialis,** with the following history :

W. U., aged eight months, was admitted to the New York Eye and Ear Infirmary under his service, March 22, 1901. The child was admitted to the pavilion for contagious eye diseases by the house surgeon, who was under the impression that the case was one of purulent ophthalmia. The child was emaciated ; it had never appeared to assimilate its food well ; the father had taken care of the child almost entirely since its birth, feeding it from the bottle. Father confined to the house with rheumatism. Mother well, worked out by the day. There is one other child, which is perfectly well. The patient's eyes have been sore for about six weeks. On examination the lids were found to be slightly swollen ; the conjunctiva thickened a very little and red ; the conjunctiva of the lower cul-de-sac was partly covered by a thick, foamy white secretion resembling somewhat a thin layer of tallow. A few flakes of secretion were present on the upper ocular and palpebral conjunctiva, the secretion presented a greasy surface and was not moistened by the tears, the corneæ had much the appearance of ground glass ; they lacked lustre. A central ulcer was present on each cornea with prolapse of iris in the left eye.

The child was restless and turned its head constantly; twitching of the right side of the face and a drawing of the corners of the mouth were noticed. Slight retraction of the head was observed. From time to time the child uttered a peculiar cry, resembling the

"cephalic" cry. Nourishment was not very well retained; however, by changing the food from time to time, a fair amount was apparently assimilated.

March 26.—Child not so well.

March 30.—Pulse very rapid and weak. The child has had several sinking spells.

April 2.—Death from exhaustion, apparently.

During the entire illness the temperature had been but little above the normal at any time.

Autopsy by Dr. DIXON.—Body greatly emaciated. Head large but well formed. Post-mortem discoloration over lower part of abdomen. Eyes greatly sunken. On opening the abdominal cavity the liver was found to be enlarged; it was yellow in color, faintly mottled with red. Spleen one-third larger than normal, dark-red in color. Pancreas normal in appearance. Kidneys enlarged, ecchymotic, especially at their lower ends; yellowish spots scattered through the cortex. Capsule not adherent. The pelvis of the left kidney was filled with a flocculent pus. Mucous membrane of the pelvis of the right kidney was covered by a frothy whitish exudate, to some degree resembling the secretion on the conjunctiva. The eyes, portions of the kidneys, liver, and spleen were removed. Tubes of blood serum were inoculated from the conjunctiva, pelvis of the kidneys, and, under antiseptic precautions, from the tissue of the liver, spleen, pancreas, and kidneys. Smears from the secretion from the conjunctiva and from the pelvis of the kidneys were prepared. The xerosis bacillus was found in the smear preparations. Cultivations were obtained in all the tubes inoculated, the colonies appearing on an average of about sixteen hours after the inoculation.

The examination showed that the bacillus was present in the solid organs of the body as well as in the secretion from the conjunctiva and mucous membrane of the pelvis of the kidneys.

Dr. KOLLER mentioned that Von Graefe had written a paper some years ago which stated that the disease was indigenous to Brazil.

Dr. WEEKS stated that the ARCHIVES of 1886 contained reports to date on xerosis. The disease is found in people who are poorly nourished. The prognosis is good when it occurs in adults; in children under one year of age it is poor. In autopsies, fatty livers are always found.

Dr. H. KNAPP made some **remarks on technique of operating**

on hypermature cataracts, and showed a patient from whose left eye he had extracted a hypermature cataract within a thickened capsule, and without excision of iris or loss of vitreous. The cataract was complicated by almost total atrophy of the choroid, causing excessive myopia. The visual field was defective in its upper inner parts. The pupil dilated well with atropine and the iris looked healthy; as the other (right) eye was also highly myopic and its lenses cataractous, the extraction of the cataract from the left eye was considered justifiable. An ordinary large upper corneal section was made, the thickened anterior capsule seized with a capsule forceps (Mathieu's) and extracted, aided by pressure with the fixing forceps which made the flap tilt and the lens move forward, so that the cataract escaped readily. The iris sank back into position. Both eyes were closed with a bandage, and the patient made as perfect and smooth a recovery as I have ever seen. When you look at the fundus you will be astonished that the patient can count fingers at 6′, despite such extensive choroidal atrophy. Dr. Knapp said that he had found an essential advantage in the combination of traction and external pressure. He demonstrated different traction instruments and discussed their value.

Dr. S. B. ALLEN read a paper, entitled **A new operative procedure for treating inflammation at the posterior part of the eye.** He stated that in treating inflammation of the lids, cornea, iris, and ciliary body, among our most potent remedies is temperature: hot water and ice-cloths. If, without injury to the ocular or orbital tissues, these remedies could be applied to the posterior part of the eye, might we not hope for a like happy result? When we consider the paucity of our remedies for these inflammations, and that in many of these diseases we are little more than spectators, unable to be of much real service, we are emboldened to advance, though at some risk. Tenon's capsule offers a familiar way for reaching the nerve and its head, the very heart of these troubles. May we not use Tenon's capsule for hot water injections, as the gynecologist uses the vagina or the aural surgeon the external canal, without damage to any of the ocular or orbital tissues? The operation would be indicated in those cases over which we have very little control. It would not be indicated in those cases over which we have control and look with reasonable hope for recovery of those cases which are due to an especial cause and are constitutional.

As a tentative measure, it might serve to loosen or hold in check an inflammation until the constitutional treatment took effect, as in syphilis, or until the system had eliminated poison as in alcohol, or after debilitating diseases where we would have time for hygiene and tonics to do their reparative work. But frankly, how many of these cases originate from causes unknown to us? The usual course is to load the circulation with the iodide, or, that failing, to give tonics. Now, why could we not extend the attack to the head of the nerve, the point of danger, the back part of the eye, before the damage has been done? Then, by adding sodium chloride to the water, we have all the conditions for osmosis. Let us recall that the opening from Tenon's capsule with the lymph spaces around the nerve are continuous with others that pass through the vitreous and the suspensory ligament to the canal of Schlemm. That in fact a very network of anastomosis is maintained between these lymph spaces and other lymph channels along the venæ vorticosæ and ciliary-nerve spaces and that these again communicate with the suprachoridal spaces and the larger spaces between Tenon's capsule and the sclera. In view, then, of these numerous avenues of drainage, of depletion, what would be the effect of these hot saline injections upon glaucoma or detachment of the retina? In cases in which we have an accentuated second aortic sound, with tortuous arteries, hard radials or carotids, a history of asthmatic attacks, with or without renal complications, the use of such a powerful agent would be contraindicated, or should be used with the greatest circumspection. He has found that the effect upon the tissues was similar, differing only in degree, whether the water was 100°, 114°, 118°, or higher. It is not our purpose to deal with the fine physiological problems caused by the action of hot water. We know it determines a rush of arterial blood to the parts, and drives the venous blood out, thus relieving stasis, improving the circulation, establishing a more healthy metabolism and an absorption of exudations. That no damage results from these injections in the rabbit, he has proved by repeated experiments; he opened the capsule over the superior rectus and, in introducing a small silver catheter, allowed water at a temperature averaging 116° to run for fifteen minutes, these experiments increased in frequency until he laves them twice daily for seven consecutive days. After submitting the left eyes of the rabbits to these experiments for a period of over four months they were examined by his colleagues, Dr.

Callan, Dr. Cocks, and Dr. Bell; they all agreed that no change had taken place. They could detect no difference between the operated and the non-operated eye.

Discussion.

Dr. CHAMBERS stated that in ear douches he used water with temperature 125° F., and that he disagreed with Dr. Allen as to the temperature which can be borne without harm.

Dr. GRUENING called attention to the fact that while the writer of the paper had stated that hot applications had done no harm, he had not proved them to be beneficial.

Dr. ALLEN stated that the personal equation must be taken into account when considering the question. Personally, he has never seen anyone stand a temperature over 120° F. in douches.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE FIRST QUARTER OF THE YEAR 1901.

By Prof. ST. BERNHEIMER, at Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin;

with the assistance of

Dr. G. Abelsdorff, Berlin; Prof. E. Berger, Paris; Dr. Dalén, Stockholm; Dr. J. Herrnheiser, Prague; Prof. Hirschmann, Charcow; Dr. J. Jitta, Amsterdam; Dr. Krahnstöver, Rome; Mr. C. Devereux Marshall, London; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; and others.

Translated by Dr. Ward A. Holden.

Sections I.–III. Reviewed by Prof. HORSTMANN.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

1. **Hirschberg.** *Introduction to Ophthalmology*, 2d half, 1st part. Thieme. Leipsic, 1901.

2. **Elschnig.** *Stereoscopic Photographic Atlas of the Pathological Anatomy of the Eye.* Part 1, with 16 plates and text. Braumüller, Vienna and Leipsic, 1901.

3. **Terson.** *Ocular Surgery.* Baillière, Paris, 1901.

4. **Groenouw** and **Uhthoff.** The relations of general and organic diseases to affections of the eye. *Graefe-Saemisch*, 2d edition, Engelmann, Leipsic, 1901.

5. **Waechter.** Ophthalmological reports. *Wiener med. Wochenschr.*, 1901, No. 2.

6. **Pergens.** Further remarks on Fukula's historical paper on refraction and ophthalmology.

7. **Brandenburg.** Eye injuries in farming communities. *Zeitschr. f. Augenheilk.*, v., 5.

8. **Ziem.** *7th Report of the Olmütz Eye Department*, 1901.

9. **Schultze.** *Report for 1899-1900 of Dr. Schultze's Ophthalmic Institute at Frankfort-on-the-Oder.* Frankfort, 1901.

10. **Mayweg.** *14th Annual Report of the Hagen Eye Hospital.* Hagen, 1901.

11. **New York Eye and Ear Infirmary.** *80th Annual Report.*

12. **Manhattan Eye and Ear Hospital.** *31st Annual Report.*

13. **Massachusetts Charitable Eye and Ear Infirmary.** *75th Annual Report*, 1900.

14. **Presbyterian Eye, Ear, and Throat Hospital of Baltimore.** *33d Annual Report*, 1900.

15. **Episcopal Eye, Ear, and Throat Hospital of Washington, D.C.** *4th Annual Report.*

16. **Brooklyn Eye and Ear Hospital.** *32d Annual Report*, Jan., 1901.

17. **Burnett, Swan M.** The position of ophthalmology in the curriculum of the modern medical school, with some suggestions as to the methods of teaching it. *Amer. Journ. of Ophth.*, Feb., 1901.

18. **Derby, H.** Use and abuse of spectacles. *Boston Med. and Surg. Journ.*, Feb. 28, 1901.

The first portion of the second half of HIRSCHBERG'S (1) *Introduction to Ophthalmology* is a continuation of the first half published several years ago. It contains a clear and explicit discussion of ophthalmoscopy, beginning with the physical relations and concluding with the objective determination of refraction.

ELSCHNIG (2) presents a series of stereoscopic photographs of pathological eyes, of natural size, which are an aid to clinical instruction but cannot replace it. Descriptive text accompanies the photographs which are partly of unopened and partly of opened eyes. Among them are emmetropic and myopic eyes, shrunken cataract and detachment of the retina, phthisis bulbi, detachment of the vitreous, iridocyclitis, corneal scars and staphyloma, and sarcoma of the choroid. The execution of the plates is excellent.

Förster's classical treatment of the relation between the eye and general diseases in *Graefe-Saemisch* has been revised in the second edition by GROENOUW and UHTHOFF (4). In the three sections that have appeared, Groenouw has discussed carefully and extensively the relations between the eye and diseases of the respiratory, circulatory, digestive, urinary, and sexual organs.

PERGENS (6) disputes the statement of Fukula that optical glasses for correcting vision were in use in the time of Theophrastus, 370 B.C.

BRANDENBURG (7) reports 410 cases of eye injury among farmers. A noticeable fact is the great percentage of patients over sixty years of age. Of the 410, 404 had suffered deterioration of vision; 197 had serpent ulcers, 88 becoming totally blind and 42 almost blind. Next in frequency to serpent ulcer was infected injury by blunt force, 120 cases.

SCHULTZE (9) treated 321 hospital patients and performed 222 operations in the years 1898–1900. Among these were 73 cases of serpent ulcer. Of 94 cataract operations, 89 had good results, 3 partial results, and 2 eyes were lost.

MAYWEG (10) performed 80 cataract operations in 1900, 26 of them being for senile cataract; 12 of these patients obtained normal vision, 8 half vision, and 6 $\frac{1}{2}$–$\frac{1}{8}$ vision. Since 1891 he has removed 82 splinters of iron from the eye with the electro-magnet. In 15 cases normal vision was obtained, in 27 a certain amount of vision, and in 22 the eye was lost.

For the year ending Sept. 30, 1900, the report of the New York Eye and Ear Infirmary (11) records in the Dispensary Department 30,878 new patients. There were 3995 operations upon the eye, of which 182 were for the extraction of cataract. The new pavilion for the care of patients suffering from contagious diseases of the eye is in process of construction and will add greatly to the facilities. ALLING.

During the year 1900, 15,038 new patients were treated in the eye department of the Manhattan Eye and Ear Hospital (12); 119 extractions are reported. ALLING.

The report of the Massachusetts Charitable Eye and Ear Infirmary for the year 1900 (13) shows a large increase in all departments. The total number of eye patients treated in the wards was 1569. In the out-patient department 19,435 new patients were treated; 930 operations were performed, of which 219 were for the extraction of cataract.

According to the report of the Presbyterian Eye, Ear, and Throat Hospital (14), the number of eye cases for the year 1900, was 7106. There were 75 extractions of cataract. ALLING.

1264 new eye-patients with 176 operations are reported, for the year 1900, at the Episcopal Eye, Ear, and Throat Hospital (15). ALLING.

The report of the Brooklyn Eye and Ear Hospital (16) shows 9199 new cases of diseases of the eye for the year 1900. There were 36 extractions of cataract and 20 iridectomies.

BURNETT (17) believes that between 45 and 50 hours should be required from the ordinary student, including lectures, demonstrations, and clinics. He emphasizes the fact that clinical ophthalmology can only be taught satisfactorily by division of the class into sections numbering not more than ten. The didactic lecture is thought to be an important factor in formulating and correlating the facts to be presented. The anatomy, physiology, and physiological optics should be thoroughly reviewed, and instruction in clinical ophthalmology should be devoted largely to external diseases. ALLING.

DERBY (18) after deploring the unnecessary use of spectacles especially in hypermetropia of low degree, strongly advocates the constant and full correction of myopia in the young. ALLING.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

19. **Grönholm.** The effect of increased tension on the blood contents of the eye. *Zeitschr. f. Augenheilk.*, v., p. 24.

20. **Schimanowsky.** A further contribution to the pathology of congenital microphthalmus with cyst of the lower lid. *Wjest. Ophth.*, 1901, pp. 12 and 127.

21. **Derendorf.** An occupation affection of workers in rubber. *Vereins. Beilage d. Deutschen med. Wochenschr.*, 1901, No. 8, p. 59.

22. **Nordyk.** A method of determining regular astigmatism. *Militair. Geneesk. Tydschr.*, iv., 4.

23. **Elschnig.** Massage in ophthalmology. *Wiener med. Blätter*, Feb. 28, 1901.

24. **Haitz.** On subconjunctival injections. *Klin. Monatsbl. f. Augenheilk.*, xxxix., pp. 49 and 106.

25. **Römer.** Experimental investigations on abrin immunity as the basis of a rational jequirity therapy. *Graefe's Archiv*, lii., p. 72.

26. **Baehr.** On enucleation of the eye. *Centralbl. f. prakt. Augenheilk.*, xxv., pp. 65 and 97.

27. **Lagrange.** Orbital heteroplasty by the transplantation of a rabbit's eye into the capsule of Tenon. *Ann. d'ocul.*, cxxv., p. 6.

28. **Nesnamoff.** The influence of the chemical rays of the sun on the course of purulent affections of the eye. *Wjest. Ophth.*, 1901, No. 1, p. 1.

29. **Goldzieher.** On the introduction of iodoform rods into the anterior chamber. *Centralbl. f. prakt. Augenheilk.*, xxv., p. 71.

30. **Alt.** Results of the histological examination of one of the blind and apparently inoffensive eyes enucleated by Dr. S. C. Ayres. *Amer. Jour. of Ophth.*, Jan., 1901.

GROENHOLM (19) has shown by experiments on rabbits that increase in tension does not bring about an increase in the amount of blood in the eye, the amount remaining fairly constant. No

increase in the calibre of the choroidal vessels can be made out with the ophthalmoscope during the period of increased tension. Since the increase of tension does not cause an increase in the amount of blood in the eye, but rather an ischæmia, and since there is in acute glaucoma a dilatation of the blood-vessels, and particularly of the veins of the ciliary body, this stasis cannot be regarded as the result of increased tension, but rather as being due to general disturbances of circulation, such as weak action of the heart, arterio-sclerosis, and local paralysis of the ocular vessels. The increase in blood causes hypersecretion of the intra-ocular liquids and increase in tension, the iris and lens are pushed forward and the chamber angle closed, rendering the hypertony permanent.

SCHIMANOWSKY (20) gives a detailed description of the microscopic condition of two microphthalmic eyes connected with cysts. In the first case, the ball was represented merely by a cyst having the properties of the primary optic vesicle, from which an undeveloped optic nerve passed backward. In the second case, both layers could be distinguished, the secondary vesicle having been formed. The lens was adherent to the papilla and covered with folds of retina. The lower-lid cyst was lined with a membrane similar to the retina, but inverted. HIRSCHMANN.

DERENDORF (21) observed, in two workers in rubber, tremor, pains in the distal portions of the limbs, headache, insomnia, decrease in strength, and nystagmus.

NORDYK (22) describes a method of determining regular astigmatism which he has used for three years in examining recruits. He used a tin disk with a cross cut out in the centre, which is placed before a light. With a mirror of 40 *cm* focus, the light cross is thrown upon the retina. In astigmatism with regular axes, a regular image is obtained, but when the disk is rotated 45° the arms of the cross appear oblique. The amount of astigmatism is determined by the cylindrical lens which rights the arms of the cross. In astigmatism with oblique axes, the arms of the cross appear oblique. The disk is then turned until the image appears regular, which gives the axis of the astigmatism, and the amount is then determined with cylindrical lenses. JITTA.

ELSCHNIG (23) calls attention to the value of massage in the treatment of eye diseases. He obtains good results in trachoma, particularly in chronic cases with thickening of the tarsus and pannus. It is of advantage also in chronic conjunctivitis,

phlyctenulæ of the conjunctiva, and spring catarrh, as well as in certain affections of the cornea and sclera, hyphæma, encapsulated lens masses, and circulatory disturbances, particularly of the retina.

According to HAITZ (24), subconjunctival injections act energetically in many external and internal affections of the eye. In general, he prefers 2% salt solution.

According to ROEMER (25), one can bring about in the eye a series of inflammatory changes without danger to vision or to the animal organism, by giving increasing doses of jequirity poison. This indicates that there is an acquired immunity of the entire organism. Roemer's experiments showed that subcutaneous injections of jequirity serum would protect the eye from external inflammations.

LAGRANGE (27), in three cases, has transplanted a rabbit's eye, as was formerly done by Chibret. After enucleation, the rabbit's eye is introduced into Tenon's capsule, and the tendons of the recti muscle are sutured to it. The transplanted eye forms a stump for an artificial eye, and the cosmetic result, as regards mobility, is very good. BERGER.

NESNAMOFF (28) used a hollow plano-convex lens of 8.D, 10 *cm* in diameter, filled with a 1:5000 solution of methylene blue. Sunlight concentrated on a rabbit's cornea with this lens caused no irritation at first, but after five minutes there was hyperæmia of the conjunctiva, with lachrymation and miosis. These symptoms increased as the illumination was continued, but even after it had been kept up fifteen minutes or more no permanent changes in the eye could be discovered.

Rabbits' corneas were inoculated with the staphylococcus aureus and under the influence of this illumination the purulent keratitis ran a favorable course without destroying the cornea.

Experiments on patients caused no pain but only a slight feeling of warmth. The author concludes: (1) that the chemical rays possess the property of relieving pain caused by inflammation; (2) they act not only upon the sensory, but also upon the vasomotor nerves, increasing the circulation of blood and lymph in the eye and facilitating the absorption of infiltration; (3) they kill bacteria not only in artificial media but also in living tissues; and (4) that they will come to be used regularly in the treatment of mycotic keratitis. HIRSCHMANN.

In five cases of severe purulent affections GOLDZIEHER (29) introduced rods of iodoform into the anterior chamber. This caused no discomfort. The immediate effect was favorable and the purulent infiltration soon disappeared.

ALT (30) found evidence of recent inflammatory processes in the various structures of the eye, which led him to conclude that it was a source of danger to the other. ALLING.

III.—INSTRUMENTS AND REMEDIES.

31. **Leroux.** A note on the oily solution of biniodide of mercury. *Arch. d'opht.*, xxi., 2, p. 93.

32. **Dasenberger.** Katharol in ophthalmology. *Wochenschr. f. Ther. u. Hyg. d. Auges*, 1901, p. 109; *Ther. d. Gegenwart*, 1901, ii., p. 93.

33. **Rollet.** The employment of methylene blue for conjunctival injections. *La semaine med.*, 1901, 8, p. 64.

34. **Vermes.** Dionin in ophthalmology. *Wochenschr. f. Ther. u. Hyg. d. Auges.*, 1901, No. 19, p. 149.

35. **Hagewinkel.** Two cases of poisoning with hydrobromate of scopolamin. *Ned. Tyds. v. Geneesk.*, 1901, No. 6.

36. **Hirschberg.** My new hand magnet. *Centralbl. f. prakt. Augenheilk.*, xxv., p. 116.

37. **Brun.** On the employment of the giant magnet in cases of iron splinters in the posterior portion of the eyeball. *Hospitaltidende* (Copenhagen), Jan. 23, 1901.

38. **Alt.** Notes on adrenalin. *Am. Jour. of Ophth.*, March, 1901.

39. **Cory, E. H.** The X-ray as an aid in the diagnosis of foreign bodies in the orbit. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1901.

LEROUX (31) regards the oily solution of biniodide of mercury, 0.004–1. *cm.* oil, as recommended by Panas as effective and not dangerous. Castor oil and other oils, which dissolve twice as much as olive oil, are less adapted than olive oil for intramuscular injection.

ROLLET (33) uses 2% solutions of methylene blue in subconjunctival injections in diseases of the cornea and iris. The results are at least as good as those following the subconjunctival injection of mercury salts or salt solution. The blue stain passes off in 4–5 hours. The methylene blue never enters the anterior chamber. BERGER.

HIRSCHBERG (36) has modified his hand magnet and has successfully extracted a splinter of steel from the vitreous.

BRUN (37) has tabulated the cases of iron splinter in the eye treated at the Grut-Bjerrum Clinic in Copenhagen in the last

twenty years. They number 125, among 103,000 patients. Before the year 1897, Hirschberg's magnet only was used, but since that date the Haab magnet has been used as well. Better results were obtained with the latter, in that splinters could more frequently be removed from the vitreous than with the Hirschberg magnet. DALÉN.

ALT (38) finds adrenalin (the isolated active principle of the suprarenal gland) immensely superior in permanency to any solution of the extract. After two and a half months the specimen solution, though somewhat weakened, could not be called spoiled. The adrenal solution seems to possess all the properties of the extract. ALLING.

CORY (39) supports his opinion that the X-ray is useful in diagnosis, by relating four cases in which foreign bodies were successfully located—two being in the eyeball and two in the orbit. ALLING.

Sections IV.–VII. reviewed by PROF. BERNHEIMER, Innsbruck.

IV.—ANATOMY.

40. **Nicolai.** A new muscle in the anterior chamber. *Ned. Tydschr. v. Geneesk.*, 1901, 1, No. 6.

41. **Pichler.** The course of the fibres in the human chiasm. *Magnus's Charts for Instruction*, Kern, Breslau, 1900.

42. **Bernheimer.** The location of the sphincter nucleus. *Report of Heidelberg Ophth. Soc.*, 1900, p. 160.

43. **Fuchs.** On the visibility of Schlemm's canal in the living eye. *Ibid.*, p. 136.

44. **Lewandowsky.** On the anatomy of the sympathetic system, according to observations on the eye. Berlin, 1901.

NICOLAI (40) suggests the possibility that the internal wall of the canal of Schlemm is of muscular structure. In fact this portion of the canal, stained by van Gieson's method, takes on the same color as the ciliary muscle, while the neighboring portion of the ligamentum pectinatum stains red. Nicolai intends to continue his investigations. JITTA.

PICHLER (41) has represented the course of the fibres in the human chiasm as revealed by Marchi's method in a case of unilateral atrophy of the optic nerve in twelve plates.

BERNHEIMER (42), by destroying in the monkey, on one side, the small-celled median nucleus, which he regards as the sphincter

nucleus, has succeeded in producing a permanent reflex iridoplegia on the same side. A dissection made four weeks later showed that only the median nucleus had been destroyed. This furnishes the proof that the small-celled, paired median nucleus is to be regarded as the sphincter nucleus. A detailed account of the operation and the microscopic examination will follow later in *Graefe's Archives.*

FUCHS (43) has found that when the delicate sclera of a young girl is strongly illuminated obliquely in a dark room, a sharp, dark line concentric with the corneal margin is seen in the location of Schlemm's canal, which doubtless is the canal filled with blood.

V.—PHYSIOLOGY.

44A. **Schoute.** The determination of the length of the living eye. *Ned. Tydschr. v. Geneesk.*, 1901, i., No. 6.

45. **Bull, G.** The measurement of the amplitude of convergence and of accommodation by means of stereoscopy. *Arch. d'opht.*, xxi., 1, p. 38.

46. **Schoen.** Accommodation in the human eye. *Ibid.*, No. 2, p. 81.

47. **Best, F.** The limits of vision. *Report Heidelberg Ophth. Soc.*, p. 129.

48. **Heine.** On bimacular vision. *Ibid.*, p. 125.

49. **Lichtwark.** The education of the color sense. Berlin, 1900.

50. **Wolf, H.** On testing the pupillary reaction with reference to the refraction of the eye examined, and on a central and peripheric pupillary reaction as shown by a new instrument. *Berl. klin. Wochenschr.*, 1900, No. 28.

51. **Fick, A. E.** On the accommodation of astigmatic persons in unconcerned vision. *Ibid.*, p. 175.

52. **Heine.** On orthoscopy, or the dependence of judgments of relative distance upon the idea of absolute distance. *Graefe's Archiv*, li., 3, p. 563.

53. **Zimmermann, C.** Light and seating in schools. *Journ. Amer. Med. Assoc.*, Jan. 19, 1901.

54. **Weiland.** Has the cornea no fixed dioptric value? *Ophth. Record*, Jan., 1901.

55. **Parsons, J. H.** On the dilatation of the pupil from cerebral stimulation of the cortex cerebri. *Am. Journ. of Ophth.*, Oct., 1900.

SCHOUTE (44A) believes that by mathematical deductions he can determine the axial length of the eye in the living. JITTA.

BULL (45) has substituted for the Holmes stereoscope a simple reflecting stereoscope for the purpose of estimating the range of convergence and accommodation and their reciprocal relations. The results, which can be obtained in a few minutes, can be employed in routine practice, when graphically expressed in metre angles and dioptries. V. MITTELSTÄDT.

According to SCHOEN (46) accommodation does not take place through contraction of the meridional fibres of the ciliary muscle, which have no connection with the zonula fibres, but through an increased tension in the vitreous chamber from the contraction of the circular fibres, which causes a change in location and form of the lens. There is no relaxation but rather an increased tension of the zonula fibres, as Tscherning concedes, although he attributes it to traction on the part of the ciliary processes. This, however, is excluded since the ciliary processes are not in connection with the anterior zonula fibres. v. MITTELSTÄDT.

HEINE (48) means by bimacular vision the highest degree of the so-called binocular visual act. He believes that there is a double nerve supply of the macula. Thus in the cortex of each occipital lobe there is a centre for both maculas. The uniting of the two optical images means that the macula's visual bundles run from the basal ganglia to the cortex of the same side, while the lateral bundles run to the cortex of the opposite hemisphere.

FICK (51) has found by experiment that most astigmatic persons in unconcerned vision focus the anterior focal line on the retina. The fact that the asthenopic symptoms usually appear first in the thirties in astigmatic persons indicates that the astigmatic person probably makes a demand upon his accommodative apparatus which cannot be fulfilled without great effort.

HEINE (52) shows by a series of experiments that in binocular vision objects are seen in their proper form at a certain distance only. Within this distance they appear in greater relief (overplastic) and beyond it in less relief, than they should.

At first sight the cornea would seem to have a varying refractive power on account of the fact that the conjugate foci maintain no constant relation in the case of refraction through a curved surface, from one medium into another, according to the laws of optics. It is nevertheless true, as shown by WEILAND (54), that the refractive power of the cornea may be expressed by the reciprocal of the anterior focal distance, and that we are justified in comparing the dioptric power of the cornea to a thin planoconvex lens, such as could be cut off from the anterior surface of the cornea. In this sense the cornea has a fixed dioptric value.

ALLING.

PARSONS's (55) experiments were on cats and dogs. He found that stimulation of the parts of the cortex concerned in eye

movements—that is, the frontal motor area for the eye muscles and the part corresponding to the occipital visual centre—gave dilatation of the pupil. The effect was diminished but not abolished by section of the cervical sympathetic, hence he concludes that the effect, under these conditions, was due to inhibition of the tonic action of the third nerve. ALLING.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

56. **De Vries.** The eyes of the new-born. Report of the Ophth. Soc. of the Netherlands (*Ned. Tydschr. d. Geneesk.*), i., No. 6.

57. **Kaplan** and **Finkelburg.** A contribution to the knowledge of the so-called ventral abducens nucleus (van Gehuchten's nucleus). *Arch. f. Psych. u. Nervenheilk.*, iii., 33.

58. **Fuchs.** The central black spot in myopia. *Zeitschr. f. Augenheilk.*, March, 1901, p. 171.

59. **Goldzieher.** Myopia operations. *Pester med.-chir. Presse*, 1901, No. 2.

60. **Heine.** Hydrophthalmus and myopia. *Report Heidelberg Ophth. Soc.*, 1900, p. 156.

61. **Treutler.** The change in refraction from removal of the lens and the optical constants of the schematic eye. *Zeitschr. f. Augenheilk.*, v., p. 39.

DE VRIES (56) examined 112 new-born infants with the ophthalmoscope. In 7 he found a physiological excavation and in 29 % a colored ring about the disk—a larger percentage than in adults. In 78 the refraction was accurately determined with the following results:

Myopia	4. D in 1.	Hyperopia	3. D in 12.
"	3. " " 2.	"	4. " " 12.
"	2. " " 1.	"	5. " " 6.
"	1. " " 1.	"	6. " " 5.
Emmetropia in	11.	"	7. " " 1.
Hyperopia	1, D in 10.	"	8. " " 1.
"	2. " " 15.		

Hyperopia between 2. and 4. D was most frequent. All the dimensions of the eye in the new-born are smaller than in the adult, but while the axial length (17 *mm*) is much shorter, the radius of curvature of the cornea is only slightly shorter than in the adult, and therefore the eye must be hyperopic, or, if not hyperopic, the curvature of the lens must be greater than in the adult, and Holth has found this to be the case. JITTA.

VII.—MUSCLES AND NERVES.

62. **Nicolai.** Binocular vision and Hering's experiment. *Ned. Tydschr. v. Geneesk.*, 1901, I, No. 3.

63. **Raymond and Cestan.** Associated paralyses of the eyes. *Bull. de la soc. de neurol. de Paris*, Jan. 10, 1901.

64. **Bielschowsky.** On the so-called paralysis of divergence. *Report Heidelberg Ophth. Soc.*, 1900, p. 110.

65. **Raimann.** A contribution to the subject of the alcoholic paralyses of the eye muscles. *Jahrbuch f. Psych.*, 20, 1.

66. **Storck.** Critical remarks on Bielschowsky's paper on uniocular diplopia without a physical basis, with remarks on the vision of strabismus patients. *Centralbl. f. Nervenheilk. u. Psych.*, 1900, p. 23.

67. **Kling.** A statistical clinical contribution to the subject of paralysis of the ocular muscles. *Inaug. Dissert.*, Giessen, 1901.

Nicolai (62), in opposition to the general opinion that Hering's test with the falling balls is the best for demonstrating the existence of binocular single vision, cites a case that he has observed, and also cases observed by Greeff and by Simon. His patient was a girl of thirteen, with divergent strabismus, who with both eyes open made 3 mistakes in 30 tests, and with one eye alone made 13 mistakes in 23 tests. Nicolai explains the fact that even squint patients perform the test successfully by supposing that a well functionating localization centre may exist even in cases in which both foveæ do not fix the same point. Jitta.

Raymond and Cestan (63) observed two cases of paralysis of lateral associated ocular movements with a co-existent hemiplegia. At the autopsy in each case a tumor of the medulla oblongata was found, located between the nucleus of the oculomotor and that of the abducens. The paralysis of associated ocular movements is to be attributed either to a destruction of the association fibres uniting the nucleus of the oculomotor with that of the abducens, or to an interference with the function of the centre for co-ordinated ocular movements

In a third case the paralysis of lateral and downward movements of both eyes came on with a sensory-motor hemiplegia after an apoplectiform attack. Berger.

Kling (67) collected 120 cases of ocular paralysis observed in the Giessen clinic between 1890 and 1900. In 52.5 % the abducens was paralyzed; in 28.5 % there was simple, and in 16.5 % complicated, paralysis of the oculomotor; and in 2.5 % paralysis of the trochlearis.

Paralysis of the external rectus was found more frequently in men than in women, and with about equal frequency before and after the thirtieth year. The third nerve and complicated paralysis also were found more frequently in men than in women.

Sections VIII.–XII. Reviewed by Dr. R. SCHWEIGGER, Berlin.

VIII.—LIDS.

67A. **Galliard.** Idiopathic œdema of the eyelids. *Ann. d'ocul.*, cxxv., p. 138.

68. **Trousseau.** Arthritic œdema of the lids. *Arch. d'opht.*, xxi., 2, p. 65.

69. **De Speville.** Acute essential inflammatory œdema of the upper lid. *Clin. opht.*, 1901, No. 4, p. 53.

70. **Zirm.** Primary lesion of the lids. *Centralbl. f. Augenheilk.*, xxv., p. 85.

71. **Verbeck.** Elephantiasis arabum of the upper and lower lids. *Med. Weekbl.*, vii., No. 43.

72. **Gabriélidès.** Blepharoplasty. Description of a new microbe in a case of malignant pustule. *Arch. d'opht.*, xx., 12, p. 650.

73. **Gifford.** Hysterical alopecia of the eyelids. *Ophth. Record*, Jan., 1901.

74. **Douglass, B.** Emphysema of the eyelid from nasal causes. *N. Y. Med. Journ.*, Mar. 23, 1901.

Trousseau (68) believes that most of the so-called idiopathic œdemas of the lids are due to rheumatism or gout, although the general disease may not be manifest. He supports his views with the citation of observations by others and by himself.

v. Mittelstädt.

Zirm (70) diagnosed as chancre a sore on the lids which had been taken for a hordeolum and expressed by a physician, after which applications were made. A week later the neighboring glands swelled and some suppurated. Six weeks later the skin eruption appeared. By this time the lid wound had developed into a deep ulcer, but it healed smoothly under mercury although the cilia were lost.

Gabriélidès (72) treated cicatricial ectropium of various origins by plastic operations with and without a pedicle to the flap, and in a case of malignant pustule of the lid he found a coccobacillus of pathological properties, which, however, was not proven to be the cause of the disease. v. Mittelstädt.

Under the above title Gifford (73) reports three cases of young girls who acquired the habit of clandestinely pulling out the eyelashes. Alling.

Douglass (74) describes four cases of emphysema of the lids —two occurring immediately after operation for opening the ethmoid cells as the result of piercing the wall of the orbit, and

two in which it appeared spontaneously, without traumatism, in patients with more or less deformity and disease of the nose.

ALLING.

IX.—LACHRYMAL APPARATUS.

75. **Alsberg.** Peculiar symmetrical affections of the lachrymal and salivary glands. *Deutsche med. Wochenschr. Vereinsbeil.*, 1901, p. 38.

76. **Lannelongue.** On a congenital lachrymo-pharyngo-facial fistula opening below the right nostril. *Comptes rendus de l'académie des sciences de Paris.* Feb. 11, 1901.

77. **De Vincentiis.** Syphiloma of the lachrymal sac. *Ann. di Ottalm.*, xxix., p. 682.

LANNELONGUE (76) observed in a girl of two years a congenital fistula opening beneath the right nostril. It communicated on the one hand with the nasal duct and on the other with the pharynx. The right nasal cavity did not communicate with the naso-pharynx. Lannelongue by an operation opened the communication between the right nasal duct and the nasal cavity and closed the external opening of the fistula by a cutaneous suture. The result was satisfactory, both as respects the passage of tears into the nasal cavity and as respects the patient's appearance.

BERGER.

X.—ORBIT AND NEIGHBORING CAVITIES.

78. **Niemann, Hermann.** Two cases of abscess of the temple following orbital phlegmon. *Inaug. Dissert.*, Greifswald, 1901.

79. **Nicolai.** A contribution to serous tenonitis. *Berl. klin. Wochenschr.*, 1901, No. 11.

80. **Ciré.** A clinical contribution to the subject of injury of the orbit. *Inaug. Dissert.*, Giessen, 1901.

81. **Zirm.** Injury of the orbital roof with a pitchfork with fatal ending. *Centralbl. f. prakt. Augenheilk.*, xxv., p. 87.

82. **Lagleyze.** Meningocele of the orbit. *Arch. d'opht.*, xx., No. 12, p. 621.

83. **Vanzetti.** Primary glioma of the orbital cavity. *Ann. di Ottalm.*, fasc. 1, p. 33, 1901.

84. **Babinski.** Salicylate of soda in the treatment of exophthalmic goitre. *Bull. de la soc. de neurol. de Paris*, Feb. 7, 1901.

85. **Risley.** Abscesses of the orbit following injury. *Ophth. Record*, 1901, p. 39.

86. **Oliver.** History of a case of removal of a retrobulbar lymphosarcoma with preservation of normal vision. *Phil. Med. Journ.*, Nov., 1900.

87. **Griffith.** Specimen of osteosarcoma of the orbit. *Ophth. Record*, 1901, p. 53.

88. **Stotz.** Melanotic sarcoma of the orbit. *Journ. Amer. Med. Assoc.*, xxxv., No. 21.

89. **Spicer.** Nævus of orbit. *Ophth. Review*, p. 26, 1901.

90. **Hamilton.** Growths in the frontal sinus. *Journ. Amer. Med. Assoc.*, 1901, 4.

NIEMANN'S (78) first case developed from an infected wound of the lid. In three days the entire half of the head became swollen. But neither from the infiltrated orbit nor from several abscesses of the lid could true pus be obtained. After an intercurrent erysipelas of brief duration, incisions into the swellings of the temporal region liberated much pus. Pus escaped also from the orbit and from abscesses in the face. Niemann believes that the infection from the orbital phlegmon passed along the veins to reach the temporal region. In his second case a deep abscess with osteomyelitis of the orbital wall and an epidural abscess developed apparently after erysipelas from an orbital phlegmon.

Niemann therefore believes that temporal abscess after phlegmon of the orbit has a tendency to spread to a dangerous depth and that it should be freely opened, although pus will not always be found. The prognosis generally is bad, but recovery took place in both of these cases.

NICOLAI (79), like Merkel, compares Tenon's space, with its two layers lined with endothelium (the episcleral and the submucous), with the cavity of a joint. Serous exudation here, as was seen in his patient in the course of articular rheumatism, causes protrusion of the balls and compression of the anterior ciliary vessels, leading to œdema of the bulbar conjunctiva while the palpebral conjunctiva is unaffected and the cornea and iris do not become inflamed. Compression of the deeper veins of the eyeball leads to stasis and cloudiness, and even small hemorrhages in the retina and optic nerve. The mobility and the ability to close the eyes are interfered with and movements are painful. In some cases Tenon's space should be punctured. As is usual, Nicolai's patient recovered under the use of antirheumatic remedies; there was, however, a tendency to relapses.

CIRÉ (80) gives a table of 35 orbital injuries seen in the Giessen clinic since 1890, making up 0.09 % of the patients. In one case, which is described in detail, after a left orbital injury a metastatic brain abscess formed on the right side which led to death.

ZIRM'S (81) case was one of injury with a pitchfork. The eye and orbit healed perfectly, but the brain was injured, and there followed mental disturbance and hemiplegia with finally purulent meningitis and death.

The meningocele observed by LAGLEYZE (82) in a girl of twenty-one, appeared to be an hypertrophy of the skin and cellular tissue occupying the entire left orbital region and extending without a sharp line of demarcation over the entire left side of the face, particularly toward the temple where the bone was thickened. The tumor was soft, elastic without fluctuation or pulsation, and increased in size when the protruding eyeball was pushed back into the orbit. After an incision into the upper lid at the orbital margin, he entered a cyst whose walls ended at the margins of a large opening in the roof of the orbit, immediately above which lay the brain. Severe hemorrhage, probably due to injury of the sinus. In order to diminish the growth of the meningocele and to relieve the deformity, the orbit was closed after enucleation of the eyeball, and a portion of the lids was removed together with some of the fatty tissue of the orbit and the neighboring region.

v. MITTELSTÄDT.

BABINSKI (84) observed, in two cases of Basedow's disease with exophthalmus, tachycardia, and goitre, a complete cure after the administration of salicylate of sodium 3-4 grm. daily for several months without interruption. BERGER.

XI.—CONJUNCTIVA.

91. **Rosenberg.** The pathological anatomy of Krause's glands. *Wjest. ophth.*, Jan.-Feb., 1901.

92. **Campos.** A case of conjunctival and corneal infection of Meibomian origin. *Arch. d' oft.*, 1901, p. 31.

93. **Lazarus.** Catarrhal conjunctivitis of the right eye cured by the extraction of the roots of 2d and 3d right upper molars. *Deutsche Wochenschr. f. Zahnheilkunde*, i., 1901.

94. **Consalvo.** An epidemic of pneumococcus conjunctivitis. *Gaz. di Ospedali e di cliniche*, 1900.

95. **Schlesinger.** A contribution to diphtheria of the conjunctiva. Pemphigus. Antitoxin. *Münch. med. Wochenschr.*, 1901, p. 101.

96. **Kimple.** A case of severe conjunctivitis crouposa with rapid destruction of both corneæ without virulent diphtheria bacilli. *Zeitschr. f. Augenheilk.*, v., 3, pp. 201-218.

97. **Greeff.** On gonorrhœal diseases of the eye. *Berl. klin. Wochenschr.*, 1901, No. 6.

98. **Groenouw.** Ophthalmia neonatorum in its clinical and bacteriological aspects *Graefe's Archiv*, lii., 1.

99. **Falta.** The treatment of trachoma with ichthargan. *Orvosi Hettiap*, 1901, p. 218.

100. **Coppez.** Tuberculosis of the conjunctiva. *Bull. de la soc. belge d' opht.*, Nov. 25, 1900.

101. **Pergens.** Shrinking of the conjunctiva due to psoriasis. *Zeitschr. f. Augenheilk.*, v., 1, pp. 14–19.

102. **Trapesontzian.** A study on the pathogenesis and pathological anatomy of pterygium. *Rév. méd. de la Suisse romaine*, 1901, No. 1.

103. **Lesshaft.** Multiple fibroma of the conjunctiva. *Klin. Monatsbl. f. Augenheilk.*, xxxv., 2, p. 151.

104. **Pergens.** Angioma of the conjunctiva. *Ibid.*, xxxviii., 1.

105. **Rogmann.** A contribution to the study of epibulbar tumors. *Ann. d'ocul.*, cxxv., p. 81.

106. **Herbert, H. Major.** The anatomy of the normal and trachomatous conjunctiva. *Journ. of Path. and Bacteriol.*, Dec., 1900.

107. **Jameson.** Notes on the bacteriology of the conjunctival sac and its bearing upon surgical procedures. *Ann. of Ophth.*, 1901.

108. **Hansell.** Case of hemorrhage from the conjunctiva in an infant. *Ophth. Record*, Feb., 1901.

109. **Jameson.** Report of a different operative method in the treatment of trachoma, with notes upon the construction of an instrument devised for the purpose. *Ibid.*

110. **Fridenberg, P.** Note on the use of the actual cautery in lymphangiectasis of the conjunctiva. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1901.

111. **Holt.** The douche in the treatment of ophthalmia neonatorum. *Journ. Amer. Med. Assoc.*, 1901, No. 1.

112. **Story.** Tuberculosis conjunctivæ. *Brit. Med. Journ.*, 1901, p. 89.

113. **Posey** and **Shumway.** Papilloma of the caruncle. *Opthth. Record*, 1901, p. 39.

ROSENBERG (91) describes the structure of a cyst extirpated from the upper retrotarsal fold where it was adherent to the upper margin of the tarsus. He supposed it to be an acquired cystoid degeneration of a blocked Krause gland which had developed as follows: An inflammatory process due to infection caused a mucoid degeneration of the epithelium of the gland, with secretion and proliferation of epithelium, leading to blocking of the duct and distension of the gland with altered secretion.

HIRSCHMANN.

SCHLESINGER'S (95) patient, an infant of eight months, exhibited a transition of a croupous into a diphtheritic conjunctivitis. At the same time there was a muco-purulent rhinitis and the general condition was disturbed. Bacteriological examination revealed no diphtheria bacilli or gonococci but strepto- and staphylo-cocci.

In the second case, an infant three months old had the entire skin of the face and neck cast off from pemphigus. Membranes covered the conjunctiva and the cloudy cornea. In the nose and throat was much muco-pus. After injection of 1000 units

of diphtheria serum and cleansing for many days, the eyes recovered perfectly. The pemphigus, however, led to death. In the eye true diphtheria bacilli as well as staphylo- and streptococci were found. The condition of the conjunctiva was similar in the two cases, but diphtheria bacilli have never been found in pure pemphigus.

In suspected cases the author regards culture experiments as necessary, and he uses antitoxin early, although ocular diphtheria usually yields to local measures.

KIMPLE (96) describes the unusual case of a small child with fever of four days' duration and a muco-purulent discharge from the nose, but whose conjunctiva was covered with a yellowish-white membrane, 1.5 *mm* thick, which was readily removed but appeared again the next day. On the 7th day the corneæ began to suppurate and break down. Antitoxin had no effect. After a month the membranes disappeared and the stumps cicatrized. Bacteriologically he found streptococci and staphylococci, and bacilli similar to diphtheria bacilli, which however were not virulent.

Nowadays the word blennorrhœa is used by some authors to designate any suppurative affection of the eye, and GREEFF (97) suggests that it might better be replaced by a bacteriological designation. Many of these cases, especially in the new-born, are free from gonococci.

Gonorrhœal conjunctivitis in the new-born, if treated properly and early, does not damage the eye, but in adults it is virulent and severe. As regards treatment, Greeff believes in mild disinfection. He instills ½ % nitrate of silver hourly, which keeps the conjunctival sac clean, and avoids brushing, wiping, and the use of pencils. Crede's instillation might be made weaker.

GROENOUW (98) carefully examined one hundred cases of purulent inflammation in the new-born, continuing his former work in this field. He concludes that blennorrhœa of the new-born may be caused by various bacteria, and sometimes none can be found in the secretion. Cases in which the gonococcus is present have the most severe and protracted course, and they alone have corneal complications and require treatment with silver long after the discharge has ceased.

A cover-glass preparation stained by Gram's method is the best way of recognizing the gonococcus. Rabbits could not be inoculated. Catarrhs with secretions free from the gonococcus were cured by the use of zinc preparations.

PERGENS (101) collected eleven observations of conjunctival affection with psoriasis and adds new cases of his own. Some of these patients suffered for decades with the skin disease. The ocular affection was a conjunctivitis or even an ulcer of the cornea with iritis. The outcome was either recovery or shrinking, adhesions, dryness of the conjunctiva, or even phthisis bulbi. Sometimes there was a direct extension of the skin affection with its copper-red plaques on to the conjunctiva.

One eye was sightless from corneal ulcer and then through repeated relapses the conjunctiva became so shrunken that an artificial eye could not be worn. A microscopic examination revealed thickened epithelium, papillary hypertrophy, and tendinous changes which were particularly subconjunctival and also extended through the entire thickness of the lid.

ROGMANN (105) gives a *résumé* of the 192 cases of epibulbar tumor already reported and adds three new cases observed clinically and examined microscopically—one a carcinoma, one a sarcoma, and one a fibroma. Fibromas are rare; according to Lagrange only three indubitable cases have been reported.

BERGER.

MAJOR HERBERT (106) has recently been working on trachoma and has examined numerous normal and diseased conjunctivæ. He claims to have demonstrated that granulation tissue is originally derived from ordinary connective tissue, which first of all becomes converted into normal adenoid tissue and from this to granulation or chronic inflammatory tissue. In the lower fornix of a human infant at birth there is no definite adenoid tissue, only here and there groups of small round cells representing the origin of lymphoid follicles. Three months after birth there is well-marked lymphoid tissue. In the transition process shown by Unna's protoplasm stain the change from connective tissue to adenoid is readily seen, and consists in the cellular elements becoming much more numerous and many of them altered from fixed connective-tissue cells to plasma cells and small round cells or lymphocytes, a large proportion of the latter being massed into follicles. Besides these there are a few polynuclear leucocytes, and in the neighboring areolar and submucous tissue a number of "mast cells" are present.

A trachoma follicle is one of the purest examples of chronic inflammatory tissue derived from connective-tissue cells.

The normal adenoid conjunctiva differs from that of chronic trachoma chiefly in its larger proportion of supporting tissue.

The trachoma follicle soon outgrows its food supply and breaks down, its products being carried away by the lymphatics. There is, however, another method of removal which comes in to play early in chronic inflammation, and this is the amœboid activity of the lymphocytes. These are commonly thought to be non-amœboid. These soft cells stretch out along the tissue spaces, often into long threads, accommodating themselves to the passages by which they travel. These movements can be well studied in sections of large palpebral papillæ which represent an occasional later development of trachoma follicles.

He also demonstrates the fact that lymphocytes, instead of coming from the blood-vessels into the tissue actually go from the tissue into the blood-vessels, thus showing that the small round cells are all derived from the connective tissue and not from the blood. The fact that these cells are passing inward and not outward is shown in some sections where the thin films of vessel walls are being pressed inward towards their lumen and not outward, as would be the case if the cells were escaping from the vessels; many of the lymphocytes in the blood, as seen within small veins, are elongated and stretched out in a way that could not be brought about in the blood but only in the tissue spaces through which they have passed. MARSHALL.

JAMESON (107) made bacteriological examination of the contents of the normal conjunctival sac in fifty cases and found thirteen sterile. The writer believes that the normal epithelial surface, the phagocytes, and the properties and mechanical action of the lachrymal secretion, all assist in overcoming the influence of the infection to which the conjunctival sac is continually subjected.

ALLING.

HANSELL'S (108) case was that of an infant, born at seven months, in which, a purulent discharge having ceased, there was a constant flow of blood, apparently from the conjunctival surface of the upper lid. The child died after having lived one month.

ALLING.

JAMESON (109) has devised an instrument consisting of a convex plate studded with numerous rows of small pyramidal projections. The cutting edges of the pyramids, according to the author, will rupture trachomatous granules and leave intact the normal mucous surface. ALLING.

(*To be concluded.*)

CORRIGENDA

to Mr. A. S. PERCIVAL's paper on Periscopic Lenses in this volume of these ARCHIVES, page 520.

Page 523, *line* 22. *For* $NK = KC_1 - NC$, *read* $KN = KC_1 - NC_1$

line 24. *For* $\text{Sin}\,(\alpha - \varphi - \varphi^1)$ *read* $\text{Sin}\,(\alpha - \varphi + \varphi^1)$

line 25. *Read* $\text{Sin}\,\psi^1 = \dfrac{r_1\,\text{Sin}\,\varphi^1 + (r_1 + t - r_2)\,\text{Sin}(\varphi - \varphi^1 - \alpha)}{r_2}$

Page 524, *line* 4. *For* $\dfrac{\text{Sin}\,(\varphi - \varphi^1)}{r,\,\text{Sin}\,\varphi}$ *read* $\dfrac{\text{Sin}\,(\varphi - \varphi^1)}{r_1\,\text{Sin}\,\varphi^1}$

Page 526, *lines* 18–20. *Read*

The dotted line represents the curvature of the surface facing the incident light, the black line the curvature of the surface next the eye.

Page 528. In the table *read*

Power	r_1	r_2
− 13 D	+ 1512 *mm*	− $42\frac{13}{16}$ *mm*
− 2 D	− 102 *mm*	− $74\frac{1}{31}$ *mm*
+ 2 D	− $64\frac{4}{15}$ *mm*	− 84 *mm*

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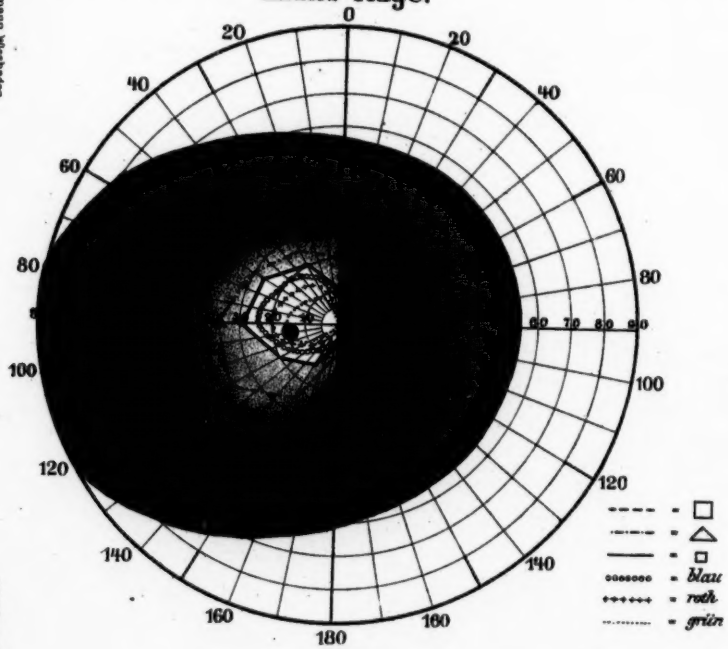

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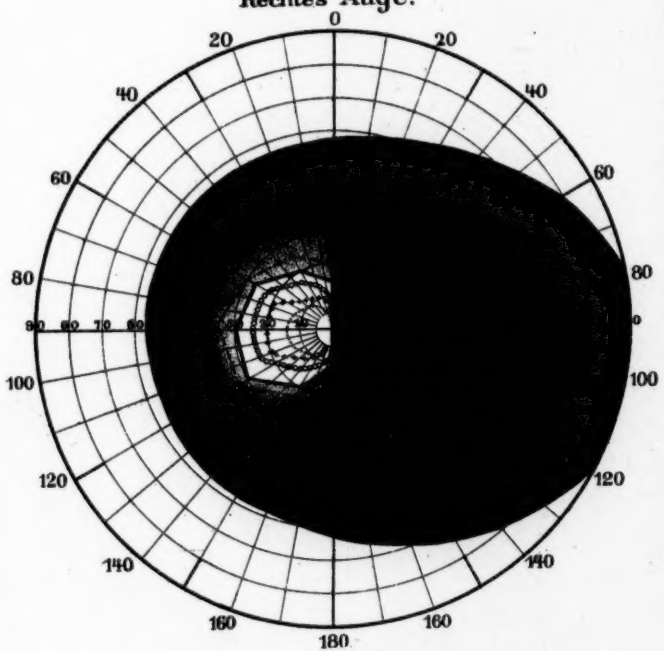

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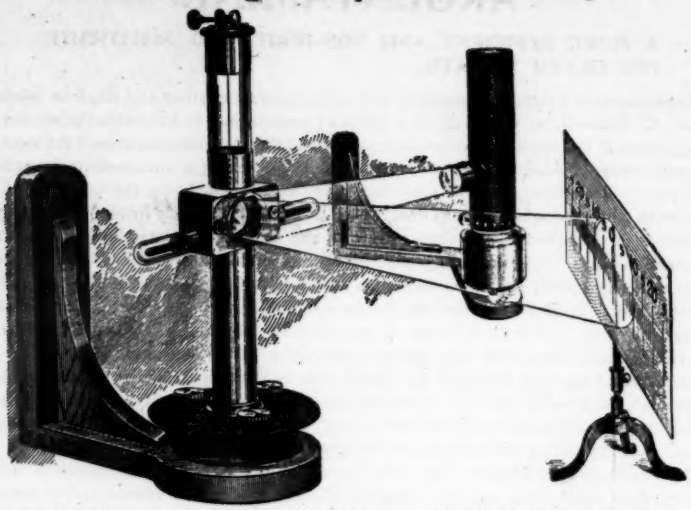

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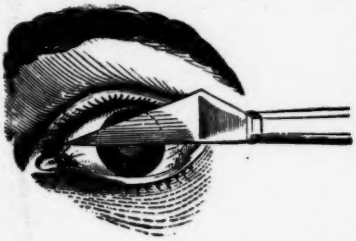

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